Item 12

Supporting Document No. 1

Regional Board Report for Public Workshop
on
Reissuance of the San Diego Municipal Storm Water Permit
(Order No. 2001-01)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

Regional Board Report for Public Workshop
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August 31, 2005

A. Introduction

The San Diego Municipal Storm Water Permit (currently Order No. 2001-01) regulates the discharge of urban runoff from municipal separate storm sewer systems (MS4s) draining the watersheds of San Diego County that are within the California Regional Water Quality Control Board, San Diego Region's (Regional Board) jurisdiction. Order No. 2001-01 covers the urban runoff discharges of the County of San Diego, the 18 incorporated cities of San Diego County, the San Diego Unified Port District, and the San Diego County Regional Airport Authority (Copermittees). The principal overarching requirements of Order No. 2001-01 are to ensure that the discharges of pollutants in urban runoff are reduced to the maximum extent practicable (MEP) and do not cause or contribute to a violation of water quality standards. To meet these requirements, the Copermittees must develop urban runoff management plans, which describe which best management practices (BMPs) and other measures the Copermittees will implement to address urban runoff. Order No. 2001-01 requires that urban runoff management plans be developed and implemented on both a jurisdictional and a watershed basis.

Order No. 2001-01 was adopted on February 21, 2001 and will expire on February 21, 2006. The order is planned to be reissued at the tentatively scheduled Regional Board meeting of February 8, 2006.

B. Background and Permit History

In considering the reissuance of Order No. 2001-01, it is important to gain a historical perspective of its evolution and implementation. The first San Diego Municipal Storm Water Permit (Order No. 90-42) was issued in 1990. To provide the Copermittees with the maximum amount of flexibility in developing and implementing their new programs, Order No. 90-42 largely consisted of broad, nonspecific requirements. Unfortunately, it was found that these broad, nonspecific requirements provided the Copermittees little incentive to develop and implement substantial and effective urban runoff management programs. While several factors are responsible for the inadequate program implementation, including lack of oversight from the Regional Board because of limited resources, it was evident that the initial permitting approach utilized in the first permit was ineffective. This finding was exhibited by monitoring data, numerous Regional Board enforcement actions, as well as environmental groups' legal action against two Copermittees for failure to implement adequate programs.

In order to improve and expand the Copermittees' urban runoff management programs, the Regional Board shifted to a more prescriptive permitting approach for the subsequent permit, which was due for renewal in July 1995. The adoption of this new permit was delayed. Two formal drafts of the renewal permit were released to the public (in 1995 and 1998 respectively) and substantial written public comments on the drafts were considered by the Regional Board. In addition, a working group of Copermittees and stakeholders was convened by the Regional Board in 1997 and 1998 to advise the Regional Board on permit reissuance issues. Despite the efforts by the public, the stakeholder group, and Regional Board, and in part due to the concurrent issuance and appeal of three other municipal storm water permits, Order No. 90-42 was not reissued by the Regional Board until 2001.

Partially due to the Regional Board's shift in regulatory approaches, as well as new categories of permit requirements, the reissuance process for Order No. 90-42 generated extensive interest. When the final draft was issued in 2000, over 1,500 public comments were received on the tentative permit, though many were duplicative. In addition, five public workshops were held by the Regional Board covering various aspects of the final draft. Following this extensive public participation process, Order No. 90-42 was reissued as Order No. 2001-01, which was adopted by the Regional Board on February 21, 2001. Order No. 2001-01 is the permit which currently regulates the Copermittees' discharges of urban runoff.

Order No. 2001-01 continued to attract interest following its adoption. The Building Industry of San Diego County, the City of San Marcos, the City of Santee, and other groups filed legal challenges of the permit with the State Water Resources Control Board, the San Diego County Superior Court, the California Court of Appeal, Fourth Appellate District, and the California State Supreme Court. Throughout this lengthy legal process, the vast majority of the permit's requirements were upheld. In particular, the Courts found that the permit's requirements had not been shown to be impracticable or unreasonable and affirmed that the Regional Board has the authority to require compliance with state water quality standards in storm water permits.

In short, Order No. 2001-01 has undergone and withstood a substantial public process and full legal review. This lengthy review process has confirmed that Order No. 2001-01 is a solid foundation on which to base the next permit, when Order No. 2001-01 is reissued in early 2006. The continued use of the general permitting approach found in Order No. 2001-01 is supported by the successes of the urban runoff program in San Diego County. Since adoption of Order No. 2001-01, the Copermittees' storm water programs have expanded dramatically. Audits of the Copermittees' programs exhibit that the Copermittees' jurisdictional programs are largely in compliance with the order. Many of the efforts currently being conducted on a regular basis by the Copermittees include: (1) construction site storm water inspections; (2) industrial facility storm water inspections; (3) municipal facility storm water inspections; (4) management of storm water quality from development projects; (5) development of BMP requirements for existing development; (6) assessment of storm water program effectiveness; and (7) management of storm water on a watershed basis. Indeed, Order No. 2001-01 received

national recognition when the United States Environmental Protection Agency awarded the Regional Board's storm water program with the 2004 Environmental Award for Outstanding Achievement.

C. Reissuance Process

The extensive public process followed during the adoption of Order No. 2001-01 mirrors the process to be followed for this permit reissuance. The first step taken by the Regional Board for reissuance of Order No. 2001-01 has been to assess the various regulatory approaches which could be used in drafting the next permit. The result of this process, the document titled the "San Diego County Municipal Storm Water Permit Reissuance Analysis Summary," was circulated for public comment. The conclusion reached in the document was to continue the current regulatory approach in the next permit, but with an expanded watershed section, which would include increased specificity for requirements to identify and abate sources of pollutants causing high priority water quality problems within watersheds. The "San Diego County Municipal Storm Water Permit Reissuance Analysis Summary" is available as Attachment A.

The reissuance process continued with the Regional Board meeting with the Copermittees on six different occasions between October 2004 and July 2005. At each of the meetings, several components of the permit were open for discussion. The purpose of the meetings was for the Regional Board and Copermittees to share their ideas for changes in the permit or the Copermittees' programs. The Regional Board also used the meetings to notify the Copermittees of areas of their programs which needed improvement. Through this notification, the Regional Board provided the Copermittees with the opportunity to propose program improvements in their Report of Waste Discharge permit reapplication (ROWD). With this approach, the Regional Board sought a ROWD from the Copermittees which contained proposals for program improvement which could meet both the Copermittees' and Regional Board's goals.

The process to reissue Order No. 2001-01 is still in its preliminary stages. The Regional Board received the Copermittees' ROWD on August 25, 2005 and is currently reviewing it. The September 14, 2005 Public Workshop is one step in the reissuance process; it will provide information to the Regional Board members on the San Diego County municipal storm water program, as well as the key topics of the permit reissuance. However, since the reissuance process is still in its preliminary stages, it is expected that resolutions to permitting issues will continue up to the Regional Board's adoption of the new permit. The permitting process will provide ample opportunity for interested parties, the Copermittees, and the Regional Board to continue to participate in the development of the new permit.

Following receipt of the Copermittees' ROWD and the public workshop, it is the Regional Board's responsibility to focus on the development of a draft tentative permit. The ROWD is essentially the Copermittees' proposal for the permit reissuance; the tentative permit is the Regional Board's first response to that proposal. Following release of a tentative permit, continued public participation opportunities will exist throughout

the rest of the reissuance process. For example, another public workshop is a possibility. In addition, an extensive written comment period is planned, where all written comments on the tentative permit will be reviewed and commented on in writing by the Regional Board. Depending on comments received, the tentative permit may then be modified in response to comments.

D. Current Conditions and Regional Board Program Goals

As discussed above, the Copermittees have achieved significant progress with their jurisdictional urban runoff management programs. However, when viewed in light of receiving water quality conditions in the region, it is imperative that this significant progress continue to be maintained. Urban runoff continues to be the leading cause of water quality problems within the San Diego Region. For example, urban runoff contributes pollutants to every impaired water body in San Diego County identified on the Clean Water Act Section 303(d) list. The monitoring conducted by the Copermittees documents the impacts of urban runoff on receiving waters. The data documenting these impacts will guide the Copermittees in taking effective action to find the sources of pollution and abate the effects of the pollutants.

1. Current Conditions - Monitoring Results and Water Quality

The Copermittees monitoring includes several components: (a) wet weather mass loading station monitoring (including toxicity monitoring); (b) bioassessment monitoring; (c) dry weather field screening and analytical monitoring; (d) coastal storm drain monitoring; and (e) ambient bay and lagoon monitoring. Each of these is briefly summarized below. The Executive Summary from the Copermittees' most recent monitoring report is included as Attachment B.

a. Wet Weather Mass Loading Station Monitoring

The Copermittees' wet weather mass loading station monitoring consists of water quality monitoring during three storm events annually within the main drainage at the base of each major watershed in San Diego County. There are currently 11 wet weather mass loading stations throughout San Diego County, where various constituents of concern, bacterial indicators, and toxicological impacts are measured. Using data collected from the wet weather mass loading stations, persistent wet weather constituents of concern have been identified by the Copermittees in their Baseline Long-Term Effectiveness Assessment document. Persistent wet weather constituents of concern are generally those constituents which have concentrations which persistently exceed water quality objectives. Increasing and decreasing trends in constituent concentrations have also been identified by the Copermittees.

Table 1. Mass Loading Station Persistent Wet Weather Constituents and Trends[1]

Mass Loading Stations	Persistent Wet Weather Constituents of Concern	Significant Trends Observed
Santa Margarita	Fecal Coliform Total Suspended Solids Turbidity	
San Luis Rey	Total Dissolved Solids	
Agua Hedionda	Fecal Coliform Total Dissolved Solids Total Suspended Solids Turbidity	Increasing chemical oxygen demand Increasing total kjeldahl nitrogen Increasing total phosphorus Increasing total suspended solids Increasing turbidity
Escondido Creek	Fecal Coliform Total Dissolved Solids Turbidity	
San Dieguito River	Total Dissolved Solids	
Penasquitos River	Total Dissolved Solids	
Tecolote Creek	Fecal Coliform Turbidity Diazinon	Increasing arsenic (still below water quality objective) Decreasing total suspended solids Decreasing total zinc
San Diego River	Fecal Coliform	
Chollas Creek	Fecal Coliform Total Suspended Solids Turbidity Diazinon Copper Zinc Toxicity (Ceriodaphnia and Hyalella)	Increasing nitrate Increasing lead Decreasing total suspended solids Decreasing total dissolved solids Decreasing nickel
Sweetwater River	Total Dissolved Solids Fecal Coliform Diazinon	
Tijuana River	Fecal Coliform Ammonia Biochemical Oxygen Demand Chemical Oxygen Demand Total Phosphorus Total Suspended Solids Turbidity Chlorpyrifos Diazinon Malathion Toxicity (Ceriodaphnia)	

b. Bioassessment Monitoring

Bioassessment monitoring is conducted to provide site-specific information about the health and diversity of freshwater benthic communities within a specific reach of a creek.

[1] San Diego County Copermittees, 2005. Baseline Long-Term Effectiveness Assessment. By Larry Walker Associates, Mikhail Ogawa Engineering, and Weston Solutions.

It consists of collecting samples of the benthic communities during dry weather and conducting a taxonomic identification to measure community abundance and diversity. Benthic community abundance and diversity is then compared to a reference creek to assess benthic community health. The Copermittees currently are required to conduct bioassessment monitoring on 23 stream reaches. The results from the Copermittees bioassessment monitoring demonstrate that the beneficial uses of urban streams are being adversely impacted by urban runoff. The San Luis Rey, Carlsbad, San Dieguito, Penasquitos, Mission Bay, San Diego River, San Diego Bay, and Tijuana River watersheds all had Poor to Very Poor Index of Biotic Integrity ratings.[2]

c. Dry Weather Field Screening and Analytical Monitoring

The Copermittees conduct dry weather field screening and analytical monitoring throughout their jurisdictions at various locations within their MS4s. While a principal purpose of the dry weather field screening and analytical monitoring is to identify illicit discharges and/or connections to the MS4, the data gathered also provides useful information regarding water quality within the Copermittees' MS4s during dry weather conditions. Data from dry weather field screening and analytical monitoring is often used effectively to identify and abate illicit discharges, but it also indicates high levels of pollutants in the Copermittees' MS4s. The number of exceedances of water quality criteria for various constituents at dry weather field screening and analytical monitoring sites frequently exceeds the number monitoring site visits conducted.[3]

d. Coastal Storm Drain Monitoring

Coastal storm drain monitoring involves monitoring discharges from coastal storm drains and nearby receiving waters for bacterial indicators. Approximately 62 coastal storm drains are monitored year round on a weekly or monthly basis, depending on the season. For samples collected in receiving waters, total coliform, fecal coliform, and Enterococcus water quality standards were exceeded at a rate of 0.6%, 1.8%, and 5.0% respectively in 2003-2004. Counts of bacterial indicators in samples collected from coastal storm drain discharges greatly exceeded those of samples collected in receiving waters, but were not reported in relation to water quality standards.[4]

e. Ambient Bay and Lagoon Monitoring

To monitor ambient bay and lagoon conditions, the Copermittees focus on assessing bay and lagoon sediments where contaminants are most likely to be found. Monitoring is conducted in twelve coastal embayments for various constituents, toxicity, and benthic

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[2] County of San Diego, 2005. San Diego County Municipal Copermittees 2003-2004 Urban Runoff Monitoring Final Report. By MEC Analytical Systems – Weston Solutions, Inc. Index of Biotic Integrity ratings give an absolute value to the benthic community quality based on the range of reference conditions in the region. The Index of Biotic Integrity ratings can be used to evaluate community conditions over time to monitor the effects of habitat degradation or the success of restoration efforts.

[3] Ibid.

[4] Ibid.

infauna. Most of the embayments monitored were found to contain toxic elements in their sediment.[5] However, this monitoring did occur in embayment areas targeted because of their likelihood to contain contaminated sediment, essentially representing worst-case scenarios.

2. Regional Board Short and Long-Term Program Goals

a. Long-Term Program Goals

The overarching long-term goal of the urban runoff program is for water bodies which receive urban runoff to meet water quality objectives and be protective of designated beneficial uses. As exhibited by the monitoring data, a considerable amount of effort will be needed to reach this goal. It is considered a long-term goal because it will difficult both to achieve and accurately assess. Water quality degradation has been shown to be directly proportional to urban growth. As San Diego grows in population, more pollutants are generated, and it will take significant effort simply to maintain current water quality levels. In addition, the ability to assess compliance with water quality standards can be limited by the current amount of data that has been collected. Factors which influence receiving water quality, such as rainfall amounts, rainfall intensity, runoff flow rates, pollutant buildup, and other factors, are all exceptionally variable. This variability in the data can make drawing conclusions regarding receiving water quality difficult.

Despite these challenges, the goal of improving receiving water quality to the point where water quality standards are met is not necessarily insurmountable. The Copermittees are still in the early stages of program implementation and assessment, despite the programs' existence for over 15 years. They have assessed the effectiveness of some of the measures they have implemented, but for many others they have not. They also need to improve tailoring their programs to target high priority water quality problems in specific watersheds. At present the Copermittees' programs are not as effective in protecting and improving receiving water quality as they can be. Moreover, because the Copermittees have not fully assessed the effectiveness of many of the BMPs they are implementing, they need to continue assessing and tailoring their programs in order to meet the MEP standard.

The urban runoff program will be considered a limited success over the long-term when trends of receiving water quality improvement are observed and continue to progress. Ultimately, these trends of receiving water quality improvement must result in achievement of water quality standards. At that point, the Regional Board's long-term goal for the urban runoff program will be met.

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[5] Ibid.

b. Short-Term Program Goals

To achieve the long-term goal of compliance with water quality standards, shorter-term goals for the next five years are necessary. The next five years essentially mirror the time period the reissued permit will be in place. The principal goal for the next permit cycle is for the Copermittees to exhibit improved pollutant load reductions through the implementation of increasingly effective BMPs which target high priority sources of pollution and abate them. In addition, where adequate data exists, identified trends of decreasing pollutant concentrations should continue, while trends of increasing pollutant concentrations should be halted, and, in some instances reversed. The ability to detect more trends in water quality should also expand.

To reach these principal short-term program goals, the Regional Board will focus in the new permit on some broad aspects of the urban runoff program. In general, increased oversight will be devoted to implementation of effective BMPs and other measures that identify and abate sources of pollutants causing high priority water quality problems in the major watersheds of San Diego County. Assessment of urban runoff management program effectiveness will also be a key focus, in order to ensure that an iterative process of BMP implementation occurs to prevent and address each watershed's high priority water quality problem.

E. Improvements to the Permit

All proposed changes to be included in the reissued permit will be assessed in light of the Regional Board's short and long-term goals for the urban runoff program. This includes the Regional Board's assessment of Copermittee proposals included in the ROWD. To meet its short and long-term goals for the urban runoff program, the Regional Board has identified some key topics which must be addressed in the reissued permit. While there are many areas of Order No. 200-01 that can be improved upon, the key topics identified are believed to be central to the success of the urban runoff program. The key topics are summarized below, and will be discussed in more detail during the September 14, 2005 Public Workshop.

1. Monitoring of Urban Runoff and Receiving Water Quality

In 2004, a Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California was developed to ensure consistency of municipal storm water program monitoring, as required by Senate Bill 72.[6] In the reissued permit, the Regional Board intends for the Copermittees' monitoring program to be consistent with this document. By being consistent with this document, the Copermittees' monitoring program will be designed to answer the following questions:

- Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?

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[6] The Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California is available at http://www.sccwrp.org/tools/stormwater.html.

- What is the extent and magnitude of the current or potential receiving water problems?
- What is the relative urban runoff contribution to the receiving water problem(s)?
- What are the sources to urban runoff that contribute to receiving water problem(s)?
- Are conditions in receiving waters getting better or worse?

2. Copermittee Assessment of the Effectiveness of their Programs

The Copermittees have developed a document titled, "A Framework for Assessing the Effectiveness of Jurisdictional Urban Runoff Management Programs," which describes how they propose to assess the effectiveness of their urban runoff management programs. The document considers assessing program effectiveness in terms of (a) compliance with activity-based permit requirements; (b) changes in knowledge/awareness; (c) changes in behavior/BMP implementation; (d) pollutant load reductions; (e) changes in discharge quality; and (f) changes in receiving water quality. In the reissued permit, the Regional Board intends to ensure that the Copermittees conduct meaningful program assessments consistent with the methods described in the assessment guidance document.

3. Management of Water Quality Issues on a Watershed Basis (Watershed Urban Runoff Management Programs (WURMPs))

The Regional Board has found the Copermittees' management of water quality issues on a watershed basis, as required by the WURMP section of Order No. 2001-01, to be inadequate. Effective measures to identify and abate pollutant sources causing high priority water quality problems within the watersheds have not adequately been implemented. In the reissued permit, the Regional Board intends to ensure that such measures are implemented.

4. Management of Urban Runoff from New Development (Standard Urban Storm Water Mitigation Plans (SUSMPs))

The Copermittees' SUSMP programs require management and treatment of urban runoff leaving new development projects. Recent audits of the Copermittees' SUSMP programs have revealed that several aspects of these programs need improvement. These include: (a) increased incorporation of site design BMPs into development projects; (b) improved tracking of permanent treatment BMPs and their maintenance; (c) improved application of effective permanent BMPs; and (d) improved training of plan review staff. In the reissued permit, the Regional Board intends to include requirements which address these issues.

F. Conclusion

The urban runoff program in San Diego County has been in the planning and establishment stage for over 15 years. It is time for the program to evolve by

implementing urban runoff management programs which effectively identify and abate sources of pollutants. The September 14, 2005 Public Workshop will provide the Regional Board with input on how this can be achieved. The Regional Board will consider and use that input to draft a tentative permit that will ensure that the urban runoff program meets the Regional Board's short and long-term goals.

Attachment A

for

Regional Board Report for Public Workshop
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SAN DIEGO COUNTY MUNICIPAL STORM WATER PERMIT REISSUANCE ANALYSIS SUMMARY

California Regional Water Quality Control Board, San Diego Region
July 26, 2004

I. INTRODUCTION

Prior to beginning the process for reissuance of the San Diego County Municipal Storm Water Permit (Order No. 2001-01), the California Regional Water Quality Control Board, San Diego Region (Regional Board) has aimed to identify the permitting approach which will best protect water quality for the next permit term while also satisfying the interests of the various stakeholders. It is anticipated that the permitting approach sought by the Regional Board will serve as a starting point which will focus the efforts of the Regional Board and stakeholders during the re-issuance process. The current permit expires on February 21, 2006; therefore it is anticipated that the next permit will be re-issued prior to that date.

This report summarizes the analysis undertaken by the Regional Board to identify its preferred permitting approach for the next storm water permit for San Diego County. The Regional Board's preferred permitting approach for the next permit is identified and discussed in section IV of this report.

II. BACKGROUND

A. Current Regulatory Approach - Order No. 2001-01

Order No. 2001-01 regulates the 21 Phase I municipal storm water Copermittees located within 10 major watersheds of San Diego County. This permit holds the local government accountable for the impacts of its land use decisions on water quality. The permit recognizes that each of the three major stages in the urbanization process (development planning, construction, and the use or operational stage) is controlled by and must be authorized by the local government. Accordingly, the permit focuses on measures that the local government must implement, or require others to implement, to reduce pollutant discharges during each of the three stages of urbanization.

The responsibilities of the Copermittees under Order No. 2001-001, however, are not limited to addressing the water quality impacts of urbanization within their jurisdiction. Each Copermittee is responsible for working with the other Copermittees on water quality issues within their shared watersheds. This is because urban runoff generated in various Copermittee jurisdictions does not follow jurisdictional boundaries, but rather travels through many jurisdictions while flowing through and to receiving waters. Collectively, the Copermittees within a watershed each contribute to the cumulative pollutant load that is conveyed in urban runoff by their interconnected municipal separate storm sewer systems

(MS4s) to the receiving waters. Therefore, each Copermittee has shared responsibility for the impacts of its urbanization on the watershed in which it is located.

The existing permit, by including watershed-based requirements, calls for the Copermittees to address water quality issues on a watershed basis in addition to their jurisdictional activities. The Copermittees are required to identify and prioritize major water quality problems in the watersheds and the likely sources of the problems; develop an implementation schedule of short- and long-term activities necessary to address the highest priority water quality problems; and identify the Copermittee(s) responsible for implementing each activity. Public participation, watershed-based land use planning, education, and long-term effectiveness assessment are also activities which are required on a watershed basis.

B. New Paradigm for Storm Water Permits

In recent years, addressing water quality issues from a watershed perspective has increasingly gained attention. Regarding watershed-based permitting, the United States Environmental Protection Agency (EPA) Watershed-Based NPDES Permitting Policy Statement issued on Jan. 7, 2004 states the following:

EPA continues to support a holistic watershed approach to water quality management. The process for developing and issuing NPDES permits on a watershed basis is an important tool in water quality management. EPA believes that developing and issuing NPDES permits on a watershed basis can benefit all watershed stakeholders, from the NPDES permitting authority to local community members. A watershed-based approach to point source permitting under the NPDES program may serve as one innovative tool for achieving new efficiencies and environmental results. EPA believes that watershed-based permitting can:

- *lead to more environmentally effective results;*
- *emphasize measuring the effectiveness of targeted actions on improvements in water quality;*
- *provide greater opportunities for trading and other market based approaches;*
- *reduce the cost of improving the quality of the nation's waters;*
- *foster more effective implementation of watershed plans, including total maximum daily loads (TMDLs); and*
- *realize other ancillary benefits beyond those that have been achieved under the Clean Water Act (e.g., facilitate program integration including integration of Clean Water Act and Safe Drinking Water Act programs).*

Watershed-based permitting is a process that ultimately produces NPDES permits that are issued to point sources on a geographic or watershed basis. In establishing point source controls in a watershed-based permit, the permitting authority may focus on watershed goals, and consider multiple pollutant sources and stressors, including the level of nonpoint source control that is practicable. In general, there are numerous

permitting mechanisms that may be used to develop and issue permits within a watershed approach.

This EPA guidance is in line with State Water Resources Control Board (SWRCB) and Regional Board watershed management goals. For example, the SWRCB's Urban Runoff Technical Advisory Committee (TAC) recommends watershed-based water quality protection, stating "Municipal permits should have watershed specific components." The TAC further recommends that "All NPDES permits and Waste Discharge Requirements should be considered for reissuance on a watershed basis."

In addition, the San Diego Region Basin Plan states that "public agencies and private organizations concerned with water resources have come to recognize that a comprehensive evaluation of pollutant contributions on a watershed scale is the only way to realistically assess cumulative impacts and formulate workable strategies to truly protect our water resources. Both water pollution and habitat degradation problems can best be solved by following a basin-wide approach."

In light of EPA's policy statement and the SWRCB's and Regional Board's watershed management goals, the Regional Board seeks to expand watershed management in the regulation of urban runoff. Watershed-based MS4 permits can provide for more effective receiving water quality protection. The entire watershed for the receiving water can be assessed, allowing for critical areas and practices to be targeted for corrective actions. Known sources of pollutants of concern can be investigated for potential water quality impacts. Problem areas can then be addressed, leading to eventual improvements in receiving water quality. Management of urban runoff on a watershed basis allows for specific water quality problems to be targeted so that efforts result in maximized water quality improvements.

C. Other Watershed-based Storm Water Permitting Efforts

Surprisingly, not all the Regional Boards in California have watershed management elements in the MS4 permits that they have adopted. Equally surprising, the Regional Board found that some storm water permits in other parts of the country that are considered watershed-based permits are not as comprehensive, prescriptive, and as advanced in terms of a watershed approach as the current storm water permit for San Diego County. The existing storm water permit already is a progressive, watershed-based permit compared to some other so-called watershed-based permits in place elsewhere.

Of particular note, however, the Oregon Department of Environmental Quality has recently issued a permit which collectively regulates four wastewater facilities and a MS4 located within a single watershed. This permit allows for trading of pollutant credits among point sources covered by the permit in an attempt to bring the entire watershed into compliance with water quality standards. Issuance of this permit was eased by the fact that all point sources within the watershed are owned by a single entity.

III. METHODOLOGY

A. Initial Screening

The Regional Board started its evaluation of the reissuance of the next storm water permit for San Diego County by identifying various permitting approaches which can be pursued. Six representative alternatives were initially identified: 1) continue with current MS4 permit; 2) enhance the Watershed Urban Runoff Management Program (WURMP) section of the current MS4 permit; 3) establish one MS4 permit for the San Diego Region; 4) establish one MS4 permit for each permittee; 5) establish MS4 permits based upon current TMDLs/impaired waterbodies; and 6) establish permits based on watersheds. These alternatives were intended to encompass the broad range of permit options available while not considering all possible permutations of each alternative.

These six alternatives were then preliminarily screened based on such basic factors as meeting Regional Board goals, watershed management effectiveness, and ease of implementation. The initial screening resulted in the elimination of several of the alternatives, due to their failure to forward the Regional Board's general goal of addressing water quality problems on a watershed basis. Other alternatives were eliminated due to issues such as difficulty in administration or lack of adequate supporting data.

B. Options Analyzed

Following this initial screening of the alternatives, two alternatives for municipal storm water regulation were identified which could best promote watershed management within the region and support stakeholder interests, while also meeting other program constraints. These two alternatives were considered for this analysis: 1) establish a MS4 permit for San Diego County with an enhanced watershed requirement section and 2) establish MS4 permits in San Diego County based on watersheds for as many as eight watersheds. These alternatives are described in more detail below.

Alternative A

Alternative A is essentially the current San Diego County MS4 Permit with an enhanced and expanded WURMP section. This alternative would continue to include a Jurisdictional Urban Runoff Management Program (JURMP) component, which would serve as a baseline level of effort that all Copermittees must implement across all watersheds. This JURMP section could potentially be slightly less stringent than the current JURMP section, in order to compensate for the expanded WURMP section. The WURMP section would contain increased detail and specificity, identifying water quality problems in each watershed, together with a focus on best management practice (BMP) requirements targeting the identified water quality problems. Formalized participation in WURMP efforts would also be required.

Alternative B

Alternative B is the regulation of San Diego County MS4s through the issuance of several permits based on watersheds or groups of watersheds. These permits would not include a JURMP section; instead, JURMP-type requirements would be incorporated into the WURMP sections of the permits. In these permits, each watershed would have a different set of requirements for each of its land use types (commercial, industrial, residential, etc.) These requirements would be based on the prominent water quality problems within the watershed. Since each watershed would have different requirements, there would not be a set of baseline requirements required of all Copermittees in all watersheds. Formalized participation in WURMP efforts would also be required.

C. Factors to be Considered in the Analysis

The Regional Board identified factors to be used to assess the two permit alternatives. The factors represent different issues which can be affected by the next San Diego County storm water permit. For ease during analysis, these factors were grouped under the following key categories: 1) Water Quality; 2) Regional Board; 3) Copermittees; and 4) Other Stakeholders. The factors considered in the analysis are described below, together with information on the premises and inferences which were necessary to conduct the analysis.

Water Quality

For the Water Quality category, the Regional Board evaluated each of the two permit alternatives in terms of the following factors: ability to obtain short-term water quality improvements, ability to obtain long-term water quality improvements, ability to facilitate efforts to address water quality problems which go beyond storm water discharges, ability to improve pollution prevention programs, and ability to address water quality impairments without TMDL implementation. Inferences that were used when evaluating the factors for each alternative were based on the Regional Board's knowledge of the implementation and effectiveness of current storm water programs. This included consideration of compliance evaluation findings, as well as information found in annual reports and monitoring reports.

Regional Board

Under this category, the Regional Board evaluated the potential impact of the two permit alternatives on Regional Board resources, programs and activities, as well as the two permit alternatives' consistency with SWRCB and Regional Board plans and policies. The evaluation of the two permit alternatives' impacts on Regional Board resources focused on the time and effort it would take to prepare the permit(s), conduct report reviews, conduct inspections, investigate complaints, handle cases, manage the program, and conduct enforcement under either permit alternative. In determining Regional Board staff time needed for the above mentioned tasks, unit cost factors developed by the SWRCB were used.

Other factors affecting the Regional Board which were assessed include each permit alternative's effect on Regional Board institutional resistance, Regional Board overall efficiency, Regional Board staff organization, Regional Board consistency with its Strategic Plan, Regional Board ability to address water quality impairments without TMDL implementation, Regional Board GIS compatibility, Regional Board compliance assurance, other Regional Board programs, potential watershed-based NPDES permits, and statewide consistency. Evaluations of these factors were based on informal staff surveys and interviews and the collective experience of the Regional Board.

Copermittees

The Copermittee category assessed the Copermittees' likely acceptance of either alternative, potential impacts to Copermittee resources, regional and statewide consistency, permit flexibility, and Copermittee willingness to collaborate. Inferences that were necessary when evaluating the factors for each permit alternative were based on current Copermittee behavior and program implementation. Consideration was also given to the ability of a single Copermittee to develop multiple and different storm water regulations for each watershed within their jurisdiction; the desire on the part of Copermittees for consistent storm water programs; and the current financial climate.

Other Stakeholders

The Other Stakeholders category (all interested parties other than the Copermittees) assessed each of the two alternatives' potential impacts on stakeholder involvement, stakeholder support, and ability to attract financial assistance to the region. The Other Stakeholders category included consideration of environmental, watershed, construction and industry, political, and public stakeholder groups. Inferences that were used when evaluating the factors for each alternative were based on currently understood stakeholder activities and positions.

D. Analysis

Each of the two permit alternatives were assessed for each factor discussed above. Based on this assessment, it was attempted to identify a preferred alternative for each factor when adequate information was known. However, it is important to note that it was sometimes difficult to identify a preferred alternative for some factors, due to lack of information or similarity between the two permit alternatives for a given factor.

Once the preferred alternative was identified for each factor where possible, each of the two permit alternatives was assessed to determine how often it was identified as the preferred alternative. Based on the number of times each permit alternative was identified as the preferred alternative, as well as the relative importance of the factors for which an alternative was preferred, a final overall preferred alternative was identified (discussed below). Due to occasional lack of adequate information and factors for which the two permit alternatives were largely indistinguishable, the final preferred alternative

was identified based upon those factors where adequate information existed and a relatively clear distinction between the alternatives was possible.

IV. CONCLUSIONS

An overall review of the various factors which were considered indicates that Alternative A is the most appropriate permit alternative for the next San Diego County storm water permit. Alternative A is the permitting approach which will continue the use of the current jurisdictional requirements, but will also expand the watershed-based requirements of the permit. Alternative A was identified as the preferred permitting approach for more factors than Alternative B. In addition, Alternative A was more frequently identified as the preferred permit alternative for factors which were considered most important.

In terms of the Water Quality category of factors, Alternative A is the most appropriate permit alternative over the short-term, while Alternative B appears to be the more appropriate permit alternative long-term. Alternative A is also the best permit alternative for both the Regional Board and Copermittee categories of factors. However, for the Other Stakeholder category of factors, Alternative B appears to be the more appropriate permit alternative. These findings are discussed below.

A. Water Quality

Of the factors considered which pertain to water quality, the key factors considered were the two permit alternatives' potential impacts on short- and long-term water quality. Alternative A promises to result in greater short term water quality improvements, while Alternative B over a longer time frame would be expected to result in greater long-term water quality benefits.

Both Alternatives A and B, in implementing a watershed approach in the implementation of storm water programs, are expected to result in water quality improvements within watersheds. Also, both permit alternatives are expected to result in permanent, long-term improvements. The advantage of Alternative A is that current ongoing efforts by Copermittees to improve water quality most likely will proceed uninterrupted. Copermittees under Alternative A will be required to expand and improve existing watershed efforts, which will allow for program continuity. Implementation of Alternative B, on the other hand, would likely divert Copermittee resources away from some current work to abate storm water pollution while the Copermittees reorganize their programs based on watersheds. For these reasons, it is anticipated that Alternative A is the best permit approach in terms of short-term water quality.

Over the long-term, the Alternative B watershed permits are believed to have greater potential for water quality improvements due to their ability to focus directly on specific water quality problems. However, implementation of Alternative A at this time does not preclude the implementation of Alternative B as a long-term step in the future. In fact, Alternative A can serve as a logical interim step before implementing watershed-based

permits. In addition, while Alternative B could have a more overall positive long-term impact on water quality than Alternative A, the Regional Board is not as confident about this as we are about the short-term benefits associated with Alternative A. It is also important to note that Alternative A includes significant expansion and improvement of existing watershed-based requirements by simply incorporating these additional watershed-based requirements into the current regulatory framework.

Moreover, the Regional Board can continue to assess watershed permits as a long-term strategy while implementing the interim step of expanded watershed-based permit requirements found in Alternative A. For example, Copermittee monitoring programs are currently watershed-based, and continued monitoring over the next permit cycle may provide sufficient data to determine trends and issues that should be addressed in future watershed-based permits.

Therefore, the Regional Board finds that Alternative A is the most prudent permitting approach for the protection of water quality at this time.

B. Regional Board

Of the factors considered which pertain to the Regional Board, the key factors considered dealt with the two permit alternatives' potential impacts on Regional Board resources. Alternative A is the preferred permitting approach because it is anticipated that it will result in Regional Board resources being used more efficiently. It is estimated that it will cost the Regional Board an additional 0.75 to 2.1 PYs to prepare the multiple watershed permits necessary under Alternative B versus the single permit under Alternative A. In addition, it is estimated that management of the permits under Alternative B will cost an additional 0.8 PYs per year. These additional resources necessary to prepare and manage the permits will reduce Regional Board efforts in report reviews, inspections, complaint investigations, and enforcement activities in the municipal, construction, and industrial storm water programs.

While implementation of Alternative A is expected to be more efficient in the short term, Alternative B could be more efficient in the long run depending upon its effectiveness. For example, Alternative B could facilitate TMDL implementation or facilitate development of comprehensive watershed-based NPDES permits that regulate all point source discharges within given watersheds. However, these potential future benefits are outweighed by the more likely near-term benefits of Alternative A. Alternative A does not necessitate a reduction in current Regional Board compliance activities, which would be detrimental to maintaining the progress made by the Copermittees in developing storm water management programs. In addition, Alternative A allows for the continuance of providing important feedback to the Copermittees that results from report reviews, inspections, attending meetings, and enforcement actions. These activities are critical at this point in the logical growth of the storm water regulatory program.

For these reasons, Alternative A is the best permitting approach for the Regional Board at this time.

C. Copermittees

Alternative A allows Copermittees to continue the efforts they started with Order No. 2001-01; limits the number of significant changes to their programs; allows them to still be treated equally; and allows them to apply the same regulations throughout their jurisdictions. Copermittees are still working on implementing all of the requirements of the current storm water permit and may be more receptive to an enhanced WURMP section rather than a watershed permit. For these reasons, Alternative A appears to be the permitting approach which would meet Copermittee needs and receive their support.

D. Other Stakeholders

Alternative B appears to be the Alternative which best meets the interests of other stakeholders (all interested parties other than the Copermittees). Alternative B would most likely generate more stakeholder interest, because of its potential to draw interest to issues typically outside of storm water. Though it is difficult to determine which approach would actually receive greater support from stakeholders as a whole, Alternative B would most likely facilitate other Regional Board interests and goals. For example, generation of funding for water quality projects in the region could be enhanced under Alternative B. While the benefits of Alternative B regarding other stakeholders could be significant, Alternative A also provides important benefits for other stakeholders, though perhaps to a lesser extent. In light of this, the benefits of Alternative B for other stakeholders, while important, are found to be less significant than the benefits of Alternative A for the Water Quality, Regional Board, and Copermittee categories of factors.

V. RECOMMENDATIONS

The Regional Board should implement Alternative A for the next permit cycle. This will increase the focus on watershed-based water quality problems and facilitate implementation of Alternative B in the future.

1. If Alternative A is implemented, the Regional Board needs to significantly change how the Regional Board currently oversees the municipal storm water program. The Regional Board's focus should significantly shift from, but not ignore, JURMP implementation to an enhanced WURMP implementation.

2. For the current San Diego County MS4 permit's reissuance, the Regional Board could use the application process as an opportunity to develop watershed-based permit conditions, regardless of which alternative is selected.

3. If a group of Copermittees within a watershed wish to pursue a watershed-based permit for their specific watershed, the Regional Board should attempt to accommodate their request. In such an instance, the resultant watershed-based permit could serve as a pilot permit which could be evaluated for future watershed

permitting efforts.

4. The Regional Board should, within the next permit cycle, evaluate the progress made by the Copermittees in implementing the enhanced WURMP-based programs and determine whether the Alternative B approach is a viable approach for all or some of the Copermittees in the future.

ATTACHMENT 1

for

San Diego County Municipal Storm Water Permit
Reissuance Analysis Summary

This attachment provides background information on the analysis conducted in the report titled "San Diego County Municipal Storm Water Permit Reissuance Analysis Summary." In section III.C of the report, various factors used by the Regional Board to assess the two permit alternatives for the next San Diego Municipal Storm Water Permit are identified. Section III.D of the report then discusses the steps that were taken to analyze the two permit alternatives in terms of the identified factors. Section IV of the report contains a discussion of the analysis of the two permit alternatives and the conclusions that were drawn regarding the alternatives.

This attachment provides support and background information for the analysis and conclusions found in Section IV of the report. It identifies the individual factors that were used to assess the two permit alternatives. These individual factors are grouped into four categories: Water Quality, Regional Board, Copermittees, and Other Stakeholders. The assessment conducted with each of the individual factors is outlined below according to these categories. The primary factors that were considered are first listed as questions, together with the assumption that was used as the basis for the analysis. The two permit alternatives are then assessed in terms of each factor in the corresponding table.

The assessments conducted using each factor were then compiled to cumulatively develop the final analysis and conclusions found in section IV of the report. In many cases, section IV of the report expands on the assessments discussed in this attachment in order to develop the final analysis and conclusions found in the report. As such, this attachment is meant to provide background information for the final analysis and conclusions found in the report, and should only be considered in conjunction with the information found in the report.

It is important to note that it was sometimes difficult to identify a preferred alternative for some individual factors, due to lack of adequate information or occasional similarities between the two permit alternatives. Where this was the case, best professional judgment and Regional Board experience was used where possible to identify a preferred alternative for an individual factor.

A. WATER QUALITY FACTOR ANALYSIS

1. Short-term Water Quality - Will the alternative result in greater short-term water quality benefits/improvements? Assumption: It would be advantageous for the alternative to generate short-term water quality benefits and improvements.

Evaluation of Short-term Water Quality		
Criteria	**Alternative A**	**Alternative B**
In the first 5 years of the permit reissuance, water quality of storm water discharges would improve.	It is difficult to predict measurable differences in discharge quality from the two alternatives in the first five years of the permit reissuance. Alternative A, however, would allow Copermittees to continue current efforts to reduce pollutants in storm water discharges.	It is difficult to predict measurable differences in discharge quality from the two alternatives in the first five years of the permit reissuance. In attempting Alternative B, some resources of the Copermittees would probably be diverted from continuing efforts to reduce pollutants in storm water discharges in order to reorganize by watersheds.
In the first 5 years of the permit reissuance, receiving water quality impacted by storm water discharges would improve.	It is difficult to predict measurable differences in receiving water quality from the two alternatives in the first five years of the permit reissuance. Alternative A, however, would allow Copermittees to continue efforts to improve receiving water quality impacted by storm water discharges.	It is difficult to predict measurable differences in receiving water quality from the two alternatives in the first five years of the permit reissuance. In attempting Alternative B, some resources of the Copermittees would probably be diverted from efforts to improve receiving water quality in order to reorganize by watersheds.
Assessment	In the short-term Copermittees would most likely spend considerable time reorganizing on a watershed basis under Alternative B. Alternative B would probably divert resources from continuing efforts to reduce pollutants in storm water dischargers and improve receiving water quality.	

2. Long-term Water Quality - Will the alternative result in greater long-term water quality benefits/improvements? Assumption: It would be advantageous for the alternative to generate long-term and lasting water quality benefits and improvements.

Evaluation of Long-term Water Quality Improvements		
Criteria	**Alternative A**	**Alternative B**
Beyond the first 5 years of the permit reissuance, water quality of storm water discharges would improve.	Implementation of this alternative would result in improved storm water discharge quality beyond the first five years.	Implementation of this alternative might result in greater long-term improvements to discharge quality than Alternative A.
Beyond the first 5 years of the permit reissuance, receiving water quality would improve.	Implementation of this alternative would result in improved receiving water quality beyond the first five years.	Implementation of this alternative might result in greater long-term improvements to receiving water quality than Alternative A.
Assessment	Five years beyond the initial permit reissuance, Alternative B, in better targeting specific water quality problems and promoting greater coordination and cooperation of Copermittees in watersheds, might result in greater long-term improvements in quality of storm water discharges and receiving waters.	

3. Addressing a Wider Range of Water Quality Problems – see section B, item 9.

4. Pollution Prevention - Will the alternative result in greater pollution prevention? Assumption: It would be positive for the alternative to encourage and accelerate efforts to prevent pollutants from being generated and discharged to surface waters.

Evaluation of Pollution Prevention		
Criteria	**Alternative A**	**Alternative B**
The alternative would accelerate efforts to prevent storm water related pollutants from being generated and discharged to receiving waters.	This alternative would emphasize the implementation of an effective pollution prevention program.	Greater that Alternative A, this alternative would ensure a coordinated pollution prevention program within a watershed.
Assessment	To the extent that Alternative B results in greater Copermittee targeting of specific water quality problems and coordination and cooperation within a watershed, Alternative B would better ensure a coordinated pollution prevention program within a watershed.	

5. Addressing Water Quality Impairments without TMDLs – see section B, item 6.

B. REGIONAL BOARD FACTOR ANALYSIS

1. Regional Board Resources – Will the alternative require greater or lesser Regional Board resources to develop and administer? Assumption: The fewer Regional Board resources that it would take to draft and oversee MS4 permits the better.

Evaluation of Regional Board Resources		
Criteria	**Alternative A**	**Alternative B**
Permit Preparation	a. Order No. 2001-01 requires the Copermittees to submit Reports of Waste Discharge (RWDs) in August 2005. The information needed in the RWDs is described in the federal regulations. b. Staff will review and process one application. c. Draft one tentative Order, with some identification of water quality issues specific to watersheds and some development of specific BMP requirements d. One comment period and hearing series e. Possible appeal of one Order Assessment: Using the unit cost factor for large MS4 permit, the permitting process will take 1350 hours	a. Additional resources will be needed for staff to notify and work with the Copermittees so that the Copermittees are able to submit multiple RWDs describing specific storm water programs for each watershed. b. Staff must review and process multiple applications. c. Draft several tentative Orders, with identification of water quality issues specific to watersheds and development of specific BMP requirements d. Multiple comment periods and hearing series e. Possible appeal of multiple Orders. Assessment: Based upon our experience with the Riverside and Orange Counties MS4 permits and the unit cost factor for a

		medium MS4 permit, our estimate is : 2 permits - 1800 hours 3 permits - 2200 hours 4 permits - 2600 hours 5 permits - 3000 hours 6 permits - 3400 hours 7 permits - 3800 hours 8 permits - 4200 hours 9 permits - 4600 hours 10 permits -5000 hours
Report Reviews	- 21 Individual JURMPs - One unified JURMP - 10 WURMPs - One Unified WURMP - One receiving water report - 21 individual annual reports Assessment: Using cost factors, approx. 1100 hrs per year	- Up to 10 unified JURMPs and WURMPs - 10 receiving water reports - Up to 43 individual annual reports Assessment: Using unit cost factors, approx. 1350 hrs per year
Inspections	Assume 6 full evaluations and 18 inspections using unit cost factors for large MS4 program. Assessment: 930 hours per year	Additional time will be necessary to evaluate programs on a watershed basis rather than a jurisdictional basis, since requirements may not be as explicit and programs could be more complex. Assessment: 1280 hours per year
Complaint Investigation	More complaints and requests for investigations occur as the public becomes more aware of the MS4 program. Assessment: 20-30 investigations a year for 120-180 hours	Alternative B will create more stakeholder involvement resulting in more public awareness and requests for investigations. Assessment: 30-40 investigations a year for 180- 240 hours
Case Handling	845 hours per major permit	Based upon unit cost factors, 68 hours for each additional permit. (for 10 watershed permits, 845 + (9 x 68) = 1457 hours)
Program Management	Unit cost factor for program management is based upon number of personnel years (PYs). This should be the same for both alternatives.	
Enforcement	One Cleanup and Abatement Order (CAO) in the last five years. Assessment: 135 hours per year	Expenditure of resources may be slightly higher as standard enforcement actions may have to be issued to the same agency for similar violations under 2 or more MS4 permits, with permits being more complex. Assessment: Assume 1 CAO, Average 150 hours per year
Assessment	Alternative B will cost approximately 0.75 – 2.1 PYs more to prepare permits and 0.8 PYs more per year to manage than Alternative A	

2. Institutional Resistance – Will the alternative generate institutional resistance within the Regional Board? Assumption: The less internal resistance to the alternative the better.

Evaluation of Institutional Resistance		
Criteria	**Alternative A**	**Alternative B**
What potential internal resistance or support is there to the alternative?	Support by those who consider the JURMP component of the program to be critical at this time.	Support by those who consider the future of the WURMP component of the program to be critical at this time.
Assessment	No known significant internal opposition or support for either alternative at this time.	

3. Efficiency – Will the alternative increase Regional Board efficiency? Assumption: The more the alternative provides an opportunity to produce equivalent results with less resources, or greater results with equivalent resources, the better.

Evaluation of Efficiency		
Criteria	**Alternative A**	**Alternative B**
Costs	As presented under No.1 (Evaluation of Regional Board Resources), because it will require more MS4 permits, Alternative B will require the Regional Board to direct PYs away from current storm water activities and towards additional permit writing, report reviews and case handling activities. These resources would be made up by doing less of something else (i.e. construction storm water inspections, designating agencies under Phase II, etc.).	
Benefits	From a program "bean counting" standpoint, Alternative B would result in more outputs in terms of permits produced, reports reviewed, and cases handled (meetings attended, outreach efforts, workshops, etc.); but would also result in less outputs in terms of audits, inspections, complaint investigations, and enforcement actions.	
Assessment	From a traditional program management standpoint (bean counting), Alternative A is preferred. From a non-traditional standpoint, the assessment of efficiency depends upon whether watershed permits will encourage sufficient initiative by the Copermittees to compensate for the use of less traditional compliance tools by the Regional Board.	

4. Staff Reorganization – Will the alternative require Regional Board staff reorganization that is not currently planned? Assumption: The more the alternative is consistent with future plans for staff reorganization the better.

Evaluation of Staff Reorganization		
Criteria	**Alternative A**	**Alternative B**
Assuming the office will in time be reorganized into watershed teams, which permit alternative will better facilitate that change?	Assigning the Permit to multiple watershed units could make management of the permit more complex. Questions such as which unit is responsible for updating the permit, attending Copermittee meetings, and being the primary contact will need to be resolved.	Watershed permits can be easily assigned to watershed units.
Assessment	Any impact on staff reorganization is minor at this time.	

5. Strategic Plan – Will the alternative be consistent with the Regional Board Strategic Plan? Assumption: The more the alternative is consistent with the Strategic Plan the better.

Evaluation of Strategic Plan		
Criteria	**Alternative A**	**Alternative B**
Organizations are effective, innovative, and responsive	Alternative B is more innovative than Alternative A.	
Surface waters are safe for drinking, fishing, and swimming, and support healthy ecosystems and other beneficial uses	This is assessed in Item A of this attachment.	
Individuals and other stakeholders support our efforts	This is assessed in Item D of this attachment.	
Water quality is comprehensively measured	This is assessed in Item A of this attachment.	
Assessment	There is little difference between the alternatives in terms of consistency with the Strategic Plan.	

6. TMDL Implementation – Will the alternative address water quality impairments, thereby decreasing the need for numerous TMDLs? Assumption: The more the alternative provides an opportunity to correct water quality impairments without conducting a TMDL the better.

Evaluation of TMDL Implementation		
Criteria	**Alternative A**	**Alternative B**
How would the alternative require necessary special studies?	Either as part of the WURMP section or under special studies in the Monitoring and Reporting program.	A requirement for special studies could be specified anywhere in the permit.
How would the alternative require watershed-based monitoring for pollutants of concern?	Either as part of the WURMP section or under special studies in the Monitoring and Reporting program.	As part of the receiving water monitoring program.
How would the alternative require mass loading reductions?	As part of the WURMP component or receiving water limitations section.	As part of the receiving water limitations section.
How would the alternative require reductions from sources other than urban runoff , such as from Phase II entities, Indian Reservations, etc.?	Not known if it can be done.	If other sources can be named as Copermittees in the watershed MS4 permit.
Assessment	Because TMDLs are for sources of pollutants within a watershed, Alternative B may better provide incentive for addressing water quality impairments without a TMDL.	

7. GIS Compatibility – Will the alternative be compatible with GIS implementation and promote and enhance its use? Assumption: The more the alternative is conducive to GIS use the better.

Evaluation of GIS Compatibility		
Criteria	**Alternative A**	**Alternative B**
Assessment	Any difference between alternatives should be minor.	

8. Enforceability/Compliance – Will the alternative promote assessment of compliance and also be enforceable? Assumption: The easier it is to assess compliance under an alternative the better.

Evaluation of Enforcement/Compliance		
Criteria	**Alternative A**	**Alternative B**
Has the alternative proven to be effective?	Alternative A has proven successful in ensuring that Copermittees implement or require implementation of BMPs under their JURMPs.	Less resources will be available for using traditional compliance and enforcement tools. By using Alternative B, reliance is placed in nontraditional compliance methods. Information is not known to be available to document success of nontraditional methods.
Assessment	Alternative A, which is based upon explicit requirements and is easier to enforce, should result in better compliance.	

9. Other Programs (Construction Storm Water, Industrial Storm Water, CalTrans Storm Water, TMDL Implementation, POTW, etc.) – Will the alternative promote and enhance other Regional Board programs? Assumption: The more the alternative can result in coordination with other programs the better.

Evaluation of Other Programs		
Criteria	**Alternative A**	**Alternative B**
Basin Planning & Water Quality Standards Non-point Source Grants TMDLs	Alternative B may facilitate coordination with these programs more than Alternative A by providing a convenient forum to exchange ideas, identify common concerns and activities, develop priorities, and coordinate schedules for actions.	
Industrial Programs	The current focus is to coordinate industrial storm water activities of the Regional Board with the Copermittees' JURMP activities.	If resources need to be diverted to manage more MS4 permits, Alternative B may negatively impact this program.
Phase II SW Programs	The current focus is to integrate Phase II program work into Phase I program work.	If resources need to be diverted to manage more MS4 permits, Alternative B may negatively impact this program.
CalTrans	The current focus is to integrate CalTrans program activities into MS4 program activities.	If resources need to be diverted to manage more MS4 permits, Alternative B may negatively impact this program.
Construction Storm Water	The current focus is to ensure adequate BMPs are being implemented at construction sites.	If resources need to be diverted to manage more MS4 permits, Alternative B may negatively impact this program.
Compliance Assurance	The current focus is to assess Copermittee JURMP activities and provide feedback. This includes compliance assurance activities to ensure that Copermittees are requiring and implementing adequate BMPs during the	If resources need to be diverted to manage more MS4 permits, Alternative B may negatively impact this program.

	planning and construction phases of development, as well as at existing municipal, commercial and industrial facilities.	
Site Mitigation/UST	No effect on program	
Land Disposal	No effect on program	
Assessment	Alternative B may negatively impact other storm water programs, but could support Basin Planning & Water Quality Standards, Non-point Source, and Grants.	

10. Watershed-based NPDES Permits – Will the alternative promote and enhance the issuance of watershed-based NPDES permits? Assumption: The more the alternative will promote and enhance watershed-based NPDES permits the better.

Evaluation of Watershed-based NPDES Permits		
Criteria	**Alternative A**	**Alternative B**
One vision for future NPDES permitting is that there would be one master NPDES permit for all point source storm water and non-storm water discharges in a watershed.	Alternative A would be a small step in this direction.	Alternative B would be a larger step in this direction, but could be even greater if all Phase II entities, Caltrans and industrial/ construction dischargers were included.
Assessment	Alternative B may provide a bigger boost to developing comprehensive watershed permits in the future, if there are no legal barriers to including other types of dischargers.	

11. Statewide Consistency - Will the alternative be consistent with other Regional Board MS4 permits? Assumption: The more the format is consistent with other Regional Board MS4 permit formats the better, provided the format ensures protection of water quality.

Evaluation of Statewide Consistency		
Criteria	**Alternative A**	**Alternative B**
Is the alternative consistent with other Regional Board MS4 permits?	Alternative B is more inconsistent with other MS4 permits than Alternative A. However the goals of both alternatives are consistent with the goals of MS4 permits adopted by other Regional Boards, i.e. reducing pollutants to MEP and requiring compliance with receiving water objectives. Both alternatives are also consistent with all State Board precedential decisions on MS4 permits.	
Assessment	Because Alternative A is consistent with previous permits and is more similar to MS4 permits issued by other Regional Boards, there is less reason for appeal of the permits to the State Board.	

C. COPERMITTEE FACTOR ANALYSIS

1. Acceptance – Will the alternative be viewed positively and with acceptance by the Copermittees? Assumption: Acceptance and a positive attitude will facilitate permit implementation and result in fewer challenges of the permit requirements.

Evaluation of Acceptance		
Criteria	**Alternative A**	**Alternative B**
Copermittees support the alternative as the correct, next step in addressing storm water issues?	Unknown. Based on informal discussions, Copermittees do expect a move towards watershed permitting, but they have not stated their opinion of this.	
Copermittees willingness to change?	Alternative A would result in similar program structure and implementation, with a change in focus to support watershed activities.	Alternative B could result in Copermittees within more than one watershed regulating areas of their City differently from other areas. Therefore, Copermittees are less likely to support this alternative.
Will this alternative result in legal challenges?	Alternative A may not result in legal challenges as this is more of a continuation of the current program.	Alternative B may result in legal challenges as this would be a "new" set of rules.
Assessment	Alternative A would be preferred as it is more similar to the current program and Copermittees could continue to treat all entities within their boundaries the same.	

2. Copermittee Resources – Will the alternative positively or negatively affect Copermittee resources? Assumption: The fewer Copermittee resources that it would take to implement all MS4 permit requirements the better.

Evaluation of Copermittee Resources		
Criteria	**Alternative A**	**Alternative B**
Reporting requirements	10 WURMPs and 1 Unified WURMP, in addition to JURMPs, annual reports, monitoring report	2-8 separate watershed reports, no JURMP required, annual reports, monitoring reports
Monitoring	Costs shared based on population.	Likely to increase costs due to multiple monitoring efforts and data analysis.
Program Implementation	Little difference for Copermittees and principal permittee, as program requirements may be similar.	Likely to increase costs as more coordination is required (dependent on number of watersheds).
Coordination/Meetings	May be a slight increase in costs as a greater emphasis is placed on watershed activities; Copermittees are not currently as focused on WURMP as JURMP actions.	Significant increase over costs of Alternative A, as Copermittees' participation in meetings, monitoring, and reporting is expected to increase (dependent upon number of watersheds).
Assessment	While Alternative B appears to result in significant cost increases, it is more likely that the Copermittees will spend the same amount of money on the entire program and instead allocate the dollars differently. This could result in poor program performance in some areas. Alternative A would retain the positive gains of the JURMP, while increasing watershed activities.	

3. Collaboration – Will the alternative support and enhance collaboration among the Copermittees? Assumption: Increasing collaboration among Copermittees can make better use of their resources while addressing storm water issues.

Evaluation of Collaboration		
Criteria	**Alternative A**	**Alternative B**
Which alternative will better generate collaboration?	Alternative A will require an increase in collaboration within a watershed, but will not require collaboration on all program elements; Copermittees will still be individually responsible for JURMP implementation.	Alternative B will require collaboration on all aspects of program implementation.
How have the Copermittees worked together in the past on WURMP efforts?	The County of San Diego provides overall guidance.	County of San Diego guidance may be limited in some watersheds based on land holdings.
Legal limitations to collaboration	Unknown	Unknown
What level of collaboration will be required?	Alternative A requires increased collaboration, but not to the level of Alternative B.	Alternative B requires Copermittees to think outside of jurisdictional boundaries and implement programs outside of jurisdictional boundaries that will benefit water quality within jurisdictional boundaries.
Assessment	While Alternative B would require greater collaboration among Copermittees, they have not currently demonstrated an eagerness to collaborate and jointly address storm water issues at such a scale. Alternative A would increase the level of collaboration while still recognizing individual programs.	

4. Flexibility – Does the alternative provide the Copermittees with flexibility in implementing their programs? Assumption: A more flexible permit would be preferred by the Copermittees, as this would allow them more choices in achieving compliance.

Evaluation of Flexibility		
Criteria	**Alternative A**	**Alternative B**
Will the alternative more readily allow changes to the permit/program?	Changes may be more contested as each change would affect all of the Copermittees.	Changes may be easier as they would be limited to the watershed that requires the change.
Will the alternative allow the Copermittees greater flexibility in meeting permit requirements?	There is little difference between the two alternatives. Both would contain specific detailed permit requirements.	There is little difference between the two alternatives. Both would contain specific detailed permit requirements.
Assessment	Alternative B may be slightly preferred because it may be easier to amend.	

5. Reporting Requirements – Will the alternative increase reporting requirements? Assumption: A permit that reduces the reporting requirements would be preferred by the Copermittees over one that keeps the requirements the same or increases the requirements.

Evaluation of Reporting Requirements		
Criteria	**Alternative A**	**Alternative B**
Number of reports	JURMP, WURMP, JURMP annual report, WURMP annual report, monitoring report	Watershed plans, watershed annual reports, monitoring reports, possible special watershed reports
Reporting effort	Less effort than Alternative B, because the required reports and formats have already been developed.	More effort than Alternative A, because new reports and formats would need to be developed.
Assessment	Alternative A would likely necessitate development of more reports, but Alternative B would likely require greater reporting effort. Therefore, there is likely little difference between the two alternatives in terms of resources expended on reporting.	

6. Statewide Consistency – Is the alternative consistent with other MS4 permits within the state? Assumption: The Copermittees will favor an alternative that is consistent with other permits in the State rather than having to develop a new type of program.

Evaluation of Statewide Consistency		
Criteria	**Alternative A**	**Alternative B**
Consistent with other MS4 permits in state?	More consistent with other permits.	Less consistent with other permits.
Is consistency necessary to achieve clean water?	Equal - permits would have requirements necessary to address regional water quality issues.	
Assessment	Alt A would be preferred by Copermittees as it is similar to other programs already in the state and region.	

7. Regional Consistency – Is the alternative consistent with other MS4 permits within the region? Assumption: The Copermittees will favor an alternative that is consistent with other permits in the region rather than having to develop a new type of program.

Evaluation of Regional Consistency		
Criteria	**Alternative A**	**Alternative B**
Consistent with other permits in region?	More consistent with other permits.	Less consistent with other permits.
Is consistency necessary to achieve clean water?	Equal - permits would have requirements necessary to address regional water quality issues.	
Assessment	Alt A would be preferred by Copermittees as it is similar to other programs already in the state and region.	

D. STAKEHOLDER FACTOR ANALYSIS

1. Stakeholder Involvement - Will the alternative be effective in generating active stakeholder involvement? Assumption: Stakeholder involvement is positive, because greater involvement can generate a better work product and more public awareness.

Evaluation of Stakeholder Involvement		
Criteria	**Alternative A**	**Alternative B**
Which alternative would generate more active stakeholder involvement from environmental groups?	Unknown, most likely negligible difference between the two alternatives.	Unknown, most likely negligible difference between the two alternatives.
Which alternative would generate more active stakeholder involvement from watershed groups?	This approach would generate stakeholder involvement from watershed groups, but less so than Alternative B.	This alternative would most likely generate more stakeholder involvement from watershed groups, because essentially all activities would be conducted at the watershed level.
Which alternative would generate more active stakeholder involvement from construction and other industry groups?	Unknown, most likely negligible difference between the two alternatives.	Unknown, most likely negligible difference between the two alternatives.
Which alternative would generate more active stakeholder involvement from political groups?	Unknown, most likely negligible difference between the two alternatives.	Unknown, most likely negligible difference between the two alternatives.
Which alternative would generate more active stakeholder involvement from the general public?	This approach would generate stakeholder involvement from the general public, but less so than Alternative B.	This alternative would most likely generate more stakeholder involvement from the general public, because watershed efforts would most likely be more prominent and visible to the public.
Assessment	Two of the identified stakeholder groups would most likely be more involved if Alternative B were used, while the reaction of the other identified stakeholder groups is unknown. Therefore, it appears that Alternative B would be the recommended alternative for this factor.	

2. Stakeholder Support - Will the alternative be supported by a majority of the stakeholders? Assumption: Stakeholder support is positive, because it increases the probability that implementation will occur and be effective.

Evaluation of Stakeholder Support		
Criteria	**Alternative A**	**Alternative B**
Environmental groups would support which alternative?	Environmental groups would most likely support this alternative, but less so than Alternative B.	This alternative would most likely be preferred by environmental groups, because it can focus more directly on specific water quality problems which they may be interested in.
Watershed groups would support which alternative?	Watershed groups would most likely support this alternative, but less so than Alternative B.	This alternative would most likely be preferred by watershed groups, because it can focus more directly on specific water quality problems which they may be interested in.
Construction and other industry groups would support which alternative?	Construction and other industry groups would not like this approach, but would prefer it over Alternative B.	Construction and other industry groups would oppose this approach, because of its potential for different standards in different

		watersheds.
Political groups would support which alternative?	Political groups would most likely not like this approach, but would prefer it over Alternative B.	Political groups would most likely oppose this approach, because of the difficulty in using inter-jurisdictional efforts.
The general public would support which alternative?	Unknown which alternative would be preferred.	Unknown which alternative would be preferred.
Assessment	Two identified types of stakeholder groups would most likely prefer Alternative A, two would most likely prefer Alternative B, and one's preference is unknown. Assuming that each type of stakeholder group is of equal importance, it appears that neither Alternative would be supported by stakeholders more than the other.	

3. Financial Assistance – Will the alternative attract financial assistance? Assumption: The ability to attract financial assistance is positive, because financial assistance can result in projects which improve water quality.

Evaluation of Financial Assistance		
Criteria	**Alternative A**	**Alternative B**
Will the alternative attract financial assistance from grants?	While this alternative could attract financial assistance from grants, Alternative B would most likely be more effective at attracting financial assistance from grants.	This alternative would most likely be more effective at attracting financial assistance from grants, because well established watershed efforts are usually more effective in attracting grant money.
Will the alternative attract financial assistance from other sources such as watershed groups, conservancies, and private parties?	Unknown	Unknown
Assessment	Alternative B is the preferred alternative for the Financial Assistance factor.	

Attachment B

for

Regional Board Report for Public Workshop
on
Reissuance of the San Diego Municipal Storm Water Permit
(Order No. 2001-01)

ES.1 Introduction

This document presents the results of the 2003-2004 municipal urban runoff monitoring conducted by MEC Analytical Systems, Inc.-Weston Solutions, Inc. (MEC-Weston) on behalf of the San Diego County Municipal Copermittees identified as dischargers of urban runoff in Order No. 2001-01 of the San Diego Regional Water Quality Control Board (RWQCB). This report fulfills the requirements of Order No. 2001-01 Attachment B, IV. *Submittal of Receiving Waters Monitoring Requirements* for Urban Stream Bioassessment Monitoring; Long-term Mass Loading Monitoring; and Ambient Bay, Lagoon, and Coastal Receiving Water Monitoring. A general overview of coastal storm drain outfall monitoring is provided in Section 13. Coastal storm drain outfall monitoring and San Diego Bay toxic hotspots monitoring, also required in Attachment B of Order 2001-01, (carried out by the appropriate jurisdictions and not conducted by MEC-Weston) are included as attachments to this document.

This report discusses activities and findings comprised of the following:

- Chemical and toxicity testing of storm water runoff from 11 mass loading stations located within major watersheds of the County of San Diego.
- Rapid stream bioassessments at a minimum of 23 stations in Fall 2003 and Spring 2004.
- Phase I and II results of ambient bay and lagoon monitoring at 12 coastal embayments.
- Dry weather, coastal outfall, and (limited) third party data as it relates to watershed water quality assessment.

The main objectives of this monitoring program are to comply with NPDES Order 2001-01 and determine the ecological health of receiving waters in the region based on chemical, physical, and biological evidence.

ES.2 Methods

ES.2.1 Storm Water Methods

Mass loading stations were located at the base of each selected watershed as far downstream as possible in each watershed and upstream of any tidal influence. Mass loading stations for this season were located along the Santa Margarita River (by Camp Pendleton), San Luis Rey River, Agua Hedionda Creek, Escondido Creek, San Dieguito River, Peñasquitos Creek, Tecolote Creek, San Diego River, Chollas Creek, Sweetwater River, and Tijuana River. Three storm events were monitored in the 2003-2004 wet-weather monitoring season at each mass loading station.

ES.2.1.1 Stream Flow Rating

During storms, the flow rate at each of the monitoring sites was determined by water velocity and stream stage (water level) sensors that are typically secured to the bottom of the channel. However, to better quantify flow rates and produce a more complete rating curve, each of the streams was also assessed using the classical stream rating method developed by the U.S. Geological Survey.

ES.2.1.2 Storm Water Constituents

Storm water samples were analyzed for general chemical constituents, total and dissolved metals (antimony, arsenic, cadmium, chromium, copper, lead, nickel, selenium, and zinc), organophosphate pesticides (diazinon and chlorpyrifos), and toxicity to bioassay test organisms. These constituent(s) of concern (COC) were measured from flow-weighted composite samples. Grab samples were used to measure some of the general physical parameters (pH, conductivity, biochemical oxygen demand, and oil and grease) and bacterial indicators (total coliform, fecal coliform, and enterococcus).

ES.2.1.3 Toxicity Testing

Toxicity testing was performed to assess the potential toxicity of storm water runoff at mass loading stations. Freshwater species used in chronic tests included a freshwater cladoceran (*Ceriodaphnia*), acute tests with a freshwater amphipod (*Hyalella*), and chronic tests with a freshwater alga (*Selenastrum*).

ES.2.2 Stream Bioassessment Monitoring

MEC-Weston conducted stream bioassessment pursuant to RWQCB Order No. 2001-01 to assess the ecological health of the watershed units in San Diego County. The assessment was undertaken utilizing a protocol that samples and analyzes populations of benthic macroinvertebrates. A total of 23 different stream monitoring reaches were assessed in San Diego County in the surveys of October 2003 and May 2004. Three of these sites were considered to represent reference conditions.

The stream bioassessment monitoring includes sampling and identification of benthic macroinvertebrates present, assessment of the physical habitat of the stream, and water quality measurements, including water temperature, specific conductance, pH, dissolved oxygen, and chlorophyll.

ES.2.3 Ambient Bay and Lagoon Monitoring

Under the NPDES permit granted to the County of San Diego by the San Diego Regional Water Quality Control Board, the Copermittees are required to develop and implement a program to assess the overall health of the receiving waters and monitor the impact of urban runoff on ambient receiving water quality. To implement the Ambient Bay and Lagoon Monitoring Program (ABLM), evaluations of sediment chemistry, sediment toxicity, and ecological community (benthic infauna) structure in twelve coastal embayments in San Diego County were monitored. The data assessed in this report were from samples collected in the summer of 2003. The program was conducted in two phases:

- **Phase I – Contaminant Targeting:** three areas in each embayment with the finest grain size and highest TOC concentration were identified using a stratified random design.

- **Phase II – Sediment Assessment:** the areas identified in Phase I were assessed using the same "triad" approach that is being utilized for the storm water runoff program: chemistry, toxicity, and biology of the sediments.

ES.2.4 Watershed Management Area Assessment Methods

The watershed assessment included an identification and prioritization of COCs based upon the prioritization system developed in the interim guidance document "Watershed Data Assessment Framework" (June 2004). Wet weather results were compared to water quality objectives to identify

COC above criteria and persistently occurring within the watershed. Dry weather information was assessed from locations upstream of the mass loading stations and compared to wet weather constituents of concern. Toxicity was evaluated for persistence in each watershed and the triad data assessment approach was applied to determine if Toxicity Identification Evaluations were needed in the watersheds.

Frequency of occurrence within each watershed was examined using the interim guidance and a matrix of findings was developed to prioritize COCs as high, medium, or low. The intent of the identification of frequency of occurrence is to provide a tool to watershed groups for prioritizing water quality concerns and identifying activities and actions.

Statistical Methods

Relationships between toxicity and COCs were examined by MLS to determine which COC may have an effect on toxicity. Additionally, long-term trends in the data for Agua Hedionda, Tecolote Creek, and Chollas Creek were examined by regression analysis to determine whether an observed upward or downward tendency of the data was statistically significant.

ES.3 Cross Watershed Comparison Statistical Methods

A cross-watershed comparison was performed to assess all information from each watershed together in order to evaluate and rank watersheds across the region. Statistical tools used for the cross watershed comparison include scatterplot analysis, regression analysis, analysis of variance (ANOVA), and multivariate cluster analysis.

The relationship between toxicity and constituents of concern for the cross watershed analysis was evaluated by two methods. The first method uses a multiple regression model to correlate changes in toxicity to changes in COC levels in the water. The second method, a threshold analysis, was used to clarify relationships following the regression analyses using the COC that were significant components of the final multiple regressions.

ES.4 Urban Runoff Monitoring Results

Results of the monitoring and assessment conducted for the 2003-2004 program are presented on a watershed basis. This meets the requirements set forth in Order 2001-01 that results be presented on a watershed basis. It is important to note that value can also be derived through examination of region-wide trends and relationships presented in Section 13, Regional Assessments in this report.

ES.4.1 Santa Margarita River WMA

The Santa Margarita River watershed management area has one mass loading station established in 2001 to characterize storm water runoff within the watershed. Sample collection was coordinated by the US Navy for Camp Pendleton (due to security concerns) and results were provided to the Copermittees for the purposes of this report.

Storm Water Monitoring

The first storm of the 2003-2004 season brought water quality exceedances in total suspended solids, total dissolved solids, turbidity, and fecal coliform. The second storm also had an exceedance in fecal coliform but suspended solids and turbidity were low. The pesticide, chlorpyrifos, appeared above the water quality objective for the first time in the short record of five storms at this site. Samples from Santa Margarita River did not cause toxicity to any of the three test species for any of the storm events monitored during 2003-04. The absence of toxicity in the Santa Margarita River storm water samples excluded the need for TIE testing.

Based upon the available data assessed, the water quality in this watershed appears to be good. A more complete assessment will be possible in future years as the limited water quality information in the watershed is expanded.

Stream Bioassessment

Stream bioassessment monitoring in the Santa Margarita River WMA included two lower watershed urban affected sites in Santa Margarita River proper, as well as four reference sites in the upper tributaries.

All of the sites had mostly undisturbed conditions, and the Index of Biotic Integrity quality ratings were mostly Fair or Good. The Santa Margarita River monitoring site on Camp Pendleton had the highest taxa richness of all of the urban affected sites in San Diego County, and the IBI scores were close to some of the reference site scores. Biological metric values and water quality measures indicated that this watershed is one of the least impacted in San Diego County.

Ambient Bay and Lagoon Monitoring

Sediments in Santa Margarita River Estuary were monitored as part of the 2003 ABLM Program to assess the potential for adverse effects from the watershed and to compare sediment quality with other coastal embayments in San Diego County. In Phase I, a stratified random approach was used to identify the three sites where COCs were most likely to be found. These sites were sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated that only six metals were found in the Estuary sediments, all at very low concentrations. Sediment toxicity was also low and not significantly different from that of a Control sample. Benthic community indices suggested that biotic community in the Estuary sediments were similar to other embayments in the County and was dominated by a gammarid amphipod and polychaete worms. For Santa Margarita River Estuary the relative ranks were 12 for chemistry and toxicity and 6 for benthic community structure.

Sediments in Oceanside Harbor were monitored as part of the 2003 ABLM Program to assess the potential for adverse effects from the watershed and to compare sediment quality with other coastal embayments in San Diego County. In Phase I, a stratified random approach was used to identify the three sites where COCs were most likely to be found (i.e., those with the highest TOC and smallest grains size). All three sites were located in the inner Harbor. In Phase II of the assessment these sites were analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated that six metals and four PAHs were found in the Harbor sediments. All of the COCs were found at low concentrations, except copper and zinc, which were slightly elevated. Percent survival of test organisms exposed to Oceanside Harbor sediments was 54%, which was significantly different from that of the Control. The source of the toxicity is unknown. The benthic

community in Oceanside Harbor ranked second highest among the embayments assessed in the ABLM Program based on benthic community indices. The community was dominated by polychaete worms, especially the tube building polychaete *Pseudopolydora paucibranchiata*. For Oceanside Harbor, the relative ranks were 4 for chemistry, 5 for toxicity, and 11 for benthos.

WMA Assessment

The data from monitoring efforts were evaluated for this watershed using the triad decision matrix. There was evidence of persistent water quality objectives exceedances in TSS and turbidity in the storm water collected from the Santa Margarita River MLS. There was no evidence of persistent toxicity. The bioassessment data indicated that benthic communities vary between Fair and Poor condition but generally rank as the best habitat in San Diego County.

ES.4.2 San Luis Rey River Watershed Management Area

Storm Water Monitoring Summary

Total dissolved solids continue to be the primary water quality concern in the watershed for wet weather events. High levels of other constituents occur occasionally. There is no clear link between dry weather results and mass loading stations data. The cause of infrequent toxicity during mass loading station monitoring is unknown. The San Luis Rey River has not been identified as a TIE candidate site based upon the Triad Decision Matrix.

Stream Bioassessment

The San Luis Rey River WMA was sampled at three sites, two urban affected sites in the San Luis Rey River, and one reference site in Doane Creek, a small tributary on Mt. Palomar. The San Luis Rey River sites had Index of Biotic Ratings of Very Poor for both sites and both surveys. The in-stream physical habitat of these sites was marginal, which could limit macroinvertebrate colonization, but it may be noted that the sites are quite similar to the Santa Margarita site on Camp Pendleton (which had a substantially higher IBI score), indicating water quality may also have been a factor. The reference site in Doane Creek, while not ecologically representative of the other sites in the program, provided interesting and valuable data for the region.

Ambient Bay and Lagoon Monitoring Program

Sediments in San Luis Rey River Estuary were monitored as part of the 2003 ABLM Program to assess the potential for adverse effects from the watershed and to compare sediment quality with other coastal embayments in San Diego County. In Phase I, a stratified random approach was used to identify the three sites where COCs were most likely to be found. These sites were sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated that six metals and ten PAHs were found in the Estuary sediments, all at very low concentrations. The mean ERM-Q for San Luis River Estuary, based on these constituents was also very low. However, toxicity associated with the sediments was significantly different from that of the Control, suggesting that there were toxic constituents in the sediments. Benthic community indices suggested that the biotic community in the Estuary ranked low compared to other embayments in San Diego County. For San Luis Rey River Estuary, the relative ranks were 10 for chemistry, 8 for toxicity, and 5 for benthic community structure.

WMA Assessment

Based upon the data assessed water quality appears to be good. However, something appears to be limiting invertebrates in the streams and estuaries. While the high TDS may be enough of a stress to insects in the marginal riparian habitats of watershed to adversely affect diversity, it is possible that unmeasured constituents in the San Luis Rey Estuary may be harming the benthic invertebrate community.

ES.4.3 Carlsbad Watershed Management Area

Storm Water Monitoring Summary

Both Escondido Creek Sub-watershed and the Agua Hedionda Sub-watershed have similar water quality concerns. Bacteria, total dissolved solids, and total suspended solids have been consistent problems. Last year, the watersheds also had exceedances of BOD and COD. Diazinon has been a problem but has shown signs of fading.

Since no toxicity at Agua Hedionda was observed in *Ceriodaphnia* during the 2003-2004 storm season, TIE testing was not performed. The absence of toxicity in the Escondido Creek storm water samples excluded the need for TIE testing.

Stream Bioassessment

The Carlsbad WMA included four bioassessment monitoring sites, two on Agua Hedionda Creek and two on Escondido Creek. Index of Biotic Integrity scores rated the benthic communities Very Poor at all four sites. The Elfin Forest site in Escondido Creek, with excellent physical habitat conditions, was at the upper limit of the Very Poor range and an impairment sensitive caddisfly was collected there. This likely indicates some measure of water quality improvement occurred between Harmony Grove Bridge and Elfin Forest. The Agua Hedionda Creek sites both had marginal in-stream habitat conditions, which may have limited macroinvertebrate colonization.

Ambient Bay and Lagoon Monitoring Program

There are four coastal embayments in the Carlsbad WMA that were monitored in the ABLM Program: Buena Vista Lagoon, Agua Hedionda Lagoon, Batiquitos Lagoon, and San Elijo Lagoon. In Phase I, a stratified random approach was used at all four sites to identify the three sites where COCs were most likely to be found (i.e., those with the highest TOC and smallest grains size).

Sites in the Buena Vista Lagoon were sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated that six of the nine metals analyzed were found in the Lagoon sediments. Concentrations were slightly higher than those found in other embayments, but were low compared to ERL and ERM values. Concentrations of all the metals were below their respective ERLs except copper. The mean ERM-Q for Buena Vista Lagoon was the third highest among the embayments assessed in the ABLM Program. In addition, the percent survival of test organisms exposed to the Lagoon sediments was significantly less than that of a Control, which suggests the presence of toxic agents. Only three taxa were found in Buena Vista Lagoon, all of which were freshwater animals. The low rankings are likely due to the influence of fresh water and lack of tidal flushing in the Lagoon rather than a greater than average contaminant loading.

Based on these results, Buena Vista Lagoon ranked last overall among the coastal embayments in San Diego County. For Buena Vista Lagoon, the relative ranks were 3 for chemistry, 7 for toxicity, and 3 for benthic community structure.

Sediments in Agua Hedionda Lagoon were sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated that six metals found in all the embayments assessed were also found in Agua Hedionda Lagoon at concentrations above the detection limit. Concentrations were slightly higher than those found in other embayments, but only one COC, copper, exceeded it respective ERL. The mean ERM-Q for Agua Hedionda Lagoon was the fifth highest among the embayments assessed in the ABLM Program and exceeded the threshold value of 0.10. Toxicity associated with the sediments was significantly different from that of the Control, suggesting that toxic constituents were present in the Lagoon. Benthic community indices suggested that the biotic community in the Lagoon sediments was intermediate compared to other embayments in San Diego County. The infaunal community was dominated by the sea slug *Acteocina inculta,* which accounted for 55.5 % of the taxa collected, horseshoe worms, and polychaete worms. For Agua Hedionda Lagoon, the relative ranks were 5 for chemistry, 4 for toxicity, and 9 for benthic community structure.

Sediments in Batiquitos Lagoon were sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated that six metals common to all of the embayments assessed were also found in Batiquitos Lagoon. Concentrations were low compared to published values, but arsenic and copper exceeded their respective ERLs. The mean ERM-Q for Batiquitos Lagoon, based on these constituents was 0.152, which was intermediate among the other coastal embayments assessed. This value exceeded the threshold of 0.10. Percent survival of test organisms exposed to sediments from Batiquitos Lagoon were significantly different from that of the control, suggesting the presence of toxic elements in the Lagoon. However, analyses of benthic community indices suggested that the biotic community in Batiquitos Lagoon ranked high compared to the other embayments. Three taxa dominated the infaunal community in Batiquitos Lagoon: the barley snail *Barleeia sp*, the herbivorous amphipod *Ampithoe longimana*, and the sea slug *Acteocina inculta*. For Batiquitos Lagoon, the relative ranks were 6 for chemistry, 2 for toxicity, and 10 for benthic community structure.

Sediments in San Elijo Lagoon were sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated that all of the nine metals assessed were found in the Lagoon sediments, but none exceeded its respective ERL value. The mean ERM-Q for San Elijo Lagoon was 0.116, which exceeded the published threshold value of 0.10. Percent survival of test organisms exposed to San Elijo Lagoon sediments was significantly different than that of the control, suggesting the presence of toxic agents in the sediments. Benthic community indices suggested that the biotic community in the Lagoon sediments ranked low compared to other embayments in San Diego County. This was primarily due to the lack of organisms found at Site 3R-4, which is located in the inner-most part of the Lagoon and receives minimal tidal flushing. The infaunal community was dominated by a genus of barley snail and polychaete worms. For San Elijo Lagoon, the relative ranks were 7 for chemistry, 3 for toxicity, and 4 for benthic community structure.

WMA Assessment

Both mass loading stations and various dry weather stations indicate that a large area of the Carlsbad Watershed Management Area has problems with bacteria sources and conventional constituents such as

total dissolved solids and total suspended solids. Diazinon is also a concern in the Agua Hedionda watershed. The water quality concerns are highlighted by the very poor rating of the macroinvertebrate communities and the high toxicity levels found in the sediments of three of the four monitored lagoons.

The source of the water quality problems in the watersheds is unknown but likely comes from several disperse sources. TDS, TSS, and turbidity were identified water quality issues in this watershed management area.

ES.4.4 San Dieguito River Watershed Management Area

Storm Water Monitoring Summary

Elevated levels of TDS during wet weather continues to be the primary water quality concern in the watershed. High levels of other constituents, particularly fecal coliform bacteria, occur occasionally, but do not appear to be consistently problematic. There was only one dry weather monitoring site located upstream of the mass loading station, but the data suggested that there was no clear link between dry and weather constituents. The cause of infrequent toxicity during mass loading station monitoring is unknown. This mass loading station has not been identified as a TIE candidate site based upon the Triad Decision Matrix.

Stream Bioassessment

The San Dieguito River WMA was sampled at two sites, Green Valley Creek at West Bernardo Drive, and San Dieguito River below Lake Hodges in October 2003 and May 2004. The macroinvertebrate community of Green Valley Creek had an Index of Biotic Integrity rating of Very Poor for both surveys, with the October survey scoring at the upper end of the Very Poor range. San Dieguito River was rated Poor in October and Very Poor in May. At the San Dieguito River site, 17 individuals of the sensitive caddisfly *Tinodes* were collected, and the moderately intolerant snail Planorbella was relatively abundant.

Ambient Bay and Lagoon Monitoring

Sediments in San Dieguito Lagoon were monitored as part of the 2003 ABLM Program to assess the potential for adverse effects from the watershed and to compare sediment quality with other coastal embayments in San Diego County. In Phase I, a stratified random approach was used to identify the three sites where COCs were most likely to be found (i.e., those with the highest TOC and smallest grains size. These sites were sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated that six metals, which were common to all the embayments assessed, were found in the Lagoon sediments, but none exceeded its respective ERL value. The mean ERM-Q for San Dieguito Lagoon was low, which suggests a low potential for toxicity. In addition, percent survival of test organisms exposed to San Dieguito Lagoon sediments was not significantly different from that of the Control, indicating a lack of toxicity associated with the sediments. The high relative rankings for chemistry and toxicity were contradicted by the biological assessment of the Lagoon, which suggested that the biotic community in the Lagoon sediments ranked low compared to other embayments in San Diego County. The lack of elevated concentrations of COCs and low toxicity associated with the sediments indicates that the low benthic community rank may have been influenced by poor habitat.

WMA Assessment

Based on the monitoring data, high TDS levels and, to a lesser extent, fecal coliform bacteria appear to be the most problematic water quality issues in San Dieguito Watershed Management Area. Elevated TDS

levels may originate from numerous sources within the watershed, possibly related to a variety of land uses. Overall, water quality appears to be good. However, the in stream benthic community appears to be limited by unknown factors. While high TDS levels may be enough of a stress to insects in the marginal riparian habitats of watershed to adversely affect diversity, there may be other constituents not measured that are impacting the watershed. In San Dieguito Lagoon, the final receiving waters for San Diego Creek, relative rankings were good for sediment chemistry and toxicity, but poor for the benthic community. These results suggest that the constituents monitored in the watershed had a minimal impact on the Lagoon, but other constituents or parameters may have influenced the benthic community.

ES.4.5 Los Peñasquitos Creek Watershed Management Area

Storm Water Monitoring Summary

Elevated levels of TDS during wet weather continues to be the primary water quality concern in the watershed. High levels of other constituents, particularly fecal coliform bacteria, occur occasionally, but do not appear to be consistently problematic. There were 13 dry weather monitoring sites located upstream of the mass loading station. The data from these sites suggested that there were several constituents that exceeded the water quality objectives (particularly oil and grease), but there was no clear link between dry and weather constituents. There has been no toxicity associated with storm water in any of the nine storms assessed since 2001. This mass loading station has not been identified as a TIE candidate site based upon the Triad Decision Matrix.

Stream Bioassessment

The Los Peñasquitos WMA was sampled at two sites. The upstream site was in Los Peñasquitos Creek in Poway, and the downstream site was in Carroll Canyon Creek in Sorrento Valley. Both of the sites had Index of Biotic Integrity ratings that were in the upper range of Very Poor or lower Poor categories. The Carroll Canyon Creek site was rated slightly higher than the upstream site on Los Peñasquitos Creek, possibly due to different watershed areas contributing to the different streams.

Ambient Bay and Lagoon Monitoring

Sediments in Los Peñasquitos Lagoon were monitored as part of the 2003 ABLM Program to assess the potential for adverse effects from the watershed and to compare sediment quality with other coastal embayments in San Diego County. In Phase I, a stratified random approach was used to identify the three sites where COCs were most likely to be found (i.e., those with the highest TOC and smallest grains size. These sites were sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated that six of the nine metals assessed were found in the Lagoon sediments, but none exceeded its respective ERL value. The mean ERM-Q for Los Peñasquitos Lagoon was 0.109, which was slightly above the published threshold value of 0.10 and suggests a small potential for increased toxicity. Percent survival of test organisms exposed to Los Peñasquitos Lagoon sediments was significantly lower than that of the Control, suggesting the presence of toxic agents in the sediments. Benthic community indices suggested that the biotic community in the Lagoon sediments was intermediate compared to other embayments in San Diego County. The infaunal community was dominated by a genus of barley snail, sea slugs, and polychaete worms.

WMA Assessment

Based on the wet weather monitoring data, high TDS levels and, to a lesser extent, fecal coliform bacteria, appear to be the most problematic water quality issues in Los Peñasquitos Creek. Dry weather

monitoring also suggested that oil and grease, diazinon, and dissolved copper may also be problematic. Based on data assessed, water quality appears to be good in Los Peñasquitos Creek. However, the instream benthic community appears to be limited by unknown factors. High TDS levels may be enough of a stress to insects in the marginal riparian habitats of watershed to adversely affect diversity. Unknown contaminants in the Los Peñasquitos Creek MLS watershed may also be harming the benthic invertebrate community but more study is needed. In Los Peñasquitos Lagoon, the final receiving waters for Los Peñasquitos Creek, relative rankings were fair for sediment chemistry, toxicity, and the benthic community. These results suggest that the constituents monitored in the watershed or other unknown factors may have influenced the benthic community in the Lagoon.

ES.4.6 Mission Bay Watershed Management Area

Storm Water Monitoring Summary

Four parameters appear to be consistently problematic in storm water runoff at the Tecolote Creek MLS: fecal coliform bacteria, TSS, turbidity, and diazinon. TSS concentrations appear to be decreasing over time, but no statistical relationships were evident for the other COCs. High levels of other constituents occur occasionally, but do not appear to be consistently problematic. There were five dry weather monitoring sites located upstream of the mass loading station that were monitored in 2003-2004. The data from these sites suggested that the water quality objectives for total coliform and enterococcus were exceeded in both dry and wet weather. There has been toxicity associated with storm water, but it appears to be related to specific storm events rather than a persistent pattern. This mass loading station has not been identified as a TIE candidate site based upon the Triad Decision Matrix.

Stream Bioassessment

The Mission Bay WMA was sampled at two sites. One site was in Rose Creek, downstream of Highway 52, and the other site was in Tecolote Creek in Tecolote Canyon Natural Park. The macroinvertebrate community of both sites had Index of Biotic Integrity ratings of Poor in October and Very Poor in May, with substantial seasonal variation in the total IBI scores. Seasonal community dynamics showed similar patterns at both sites, with percent collector filterers plus collector gatherers (represented at both sites by *Simulium*, Chironomids, and Ostracods) and macroinvertebrate density much higher in May, and with percent predators, taxa richness, and overall IBI score higher in October.

Ambient Bay and Lagoon Monitoring

Sediments in Mission Bay were monitored as part of the 2003 ABLM Program to assess the potential for adverse effects from the watershed and to compare sediment quality with other coastal embayments in San Diego County. In Phase I, a stratified random approach was used to identify the three sites where COCs were most likely to be found (i.e., those with the highest TOC and smallest grains size). These sites were sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated that seven of the nine metals assessed were found in Mission Bay sediments. Of these, arsenic, copper, and lead exceeded their respective ERL values, but all concentrations were well below their respective ERMs. The mean ERM-Q for Mission Bay was the highest of any embayment assessed in the ABLM Program. In contrast to the sediment chemistry results, the percent survival of test organisms exposed to Mission Bay sediments was not significantly different from that of the Control, suggesting that the sediments were not significantly toxic to the test organisms. Benthic community indices suggested that the biotic community in Mission Bay ranked the highest of all the embayments assessed in the ABLM Program. The infaunal community was dominated by a genus of barley snail, a marine isopod, and the Asian mussel.

WMA Assessment

Based on the wet weather monitoring data, turbidity, fecal coliform bacteria, and diazinon appear to be the most problematic water quality issues in Tecolote Creek. Dry weather monitoring also suggested that COD, TSS, total coliform and enterococcus may also be problematic, although their frequencies of occurrence were ranked as low. There was no evidence of persistent toxicity associated with samples collected from the Tecolote Creek MLS. However, the instream benthic community ranked as very poor in 2003-2004, suggesting evidence of benthic alteration. Physical habitat disturbance may play a role in the limited benthic community. Insecticides such as diazinon, which had a medium frequency of occurrence in the watershed, may also be a limiting factor. Synergistic effects and unknown contaminants in the Mission Bay watershed may also be harming the benthic invertebrate community but more study is needed. In Mission Bay, the final receiving waters for Tecolote Creek, relative rankings were fair for sediment chemistry, and good for toxicity and the benthic community. These results suggest that the constituents monitored in the watershed may have influenced the sediments, but the benthic community in the Bay has not been substantially impacted.

ES.4.7 San Diego River Watershed Management Area

Storm Water Monitoring Summary

Turbidity, TDS and elevated levels of bacterial indicators, specifically fecal coliform, appear to be the most consistent, primary water quality concerns within the watershed. Continued monitoring will indicate if chlorpyrifos and diazinon are actually decreasing within the watershed as suggested by monitoring conducted in 2003-2004. This mass loading station has not been identified as a TIE candidate site based upon the Triad Decision Matrix.

Stream Bioassessment

The San Diego River WMA was sampled at two monitoring sites on San Diego River, one in Mission Trails Regional Park, and one near Morena Blvd. in Mission Valley. The Mission Trails site had an Index of Biotic Integrity rating of Poor, and the Mission Valley site had an IBI rating of Very Poor. The Mission Valley site was the lowest rated site in the San Diego County Stormwater program for both the October and May surveys.

Ambient Bay and Lagoon Monitoring

No sampling was performed at the mouth of the San Diego River as part of the Ambient Bay and Lagoon Monitoring program.

WMA Assessment

Water quality in the San Diego River WMA is generally good. The watershed assessment process did not identify any constituents having a high frequency of occurrence. Several constituents, including bacterial indicators, TDS, turbidity and pesticides, had a low to medium frequency of occurrence. The occurrence of these constituents may be a result of numerous activities or sources. The stream habitat quality is rated Poor in Mission Trails, a large open recreation space, and Very Poor in Mission Valley, a highly urbanized residential and commercial corridor. The Very Poor rating in Mission Valley may be a result of physical disturbances to habitat, insecticides or other COCs, or algal growth observed and measured as chlorophyll within the stream.

ES.4.8 San Diego Bay Watershed Management Area

Storm Water Monitoring Summary

The Chollas sub-watershed within the Pueblo San Diego watershed and the Sweetwater watershed are two watersheds that comprise the San Diego Bay WMA. The differences in water quality between these two watersheds likely reflect the differences in land uses. Chollas Creek is highly urban with nearly 66% of the area classified as residential and 17% of the area classified as commercial. Water quality problems within Chollas Creek are typical of heavily residential and commercial areas with frequent water quality exceedances of turbidity, TSS, bacterial indicators, total and dissolved copper and total zinc. Sweetwater watershed has nearly 50% open space and a lower percentage of residential and commercial than Chollas Creek. Aside from bacterial indicators, Sweetwater River does not have persistent water quality problems.

Chollas Creek and Sweetwater River have been identified as a TIE candidate sites based utilizing the Triad Decision Matrix. Results at both sites indicate that the toxicity found was diminished during the time between the initial monitoring tests to when the TIE tests were initiated. Due to this evidence of temporal variation of toxicity within both samples, future TIE testing should be initiated in parallel with the monitoring test.

Stream Bioassessment

Three monitoring sites were sampled in the San Diego Bay WMA. One site was in Chollas Creek at Federal Blvd., and two sites were in Sweetwater River, at Highway 94 in Rancho San Diego and along Bonita Road. Chollas Creek had Index of Biotic Integrity ratings of Poor and Very Poor, and the Sweetwater River sites were rated Very Poor for both sites and for both surveys. The Sweetwater River sites had in-stream physical characteristics that provided little stable habitat for macroinvertebrate colonization, which may have negatively affected the IBI scores.

Ambient Bay and Lagoon Monitoring Program

Sediments in Sweetwater River Estuary were monitored as part of the 2003 ABLM Program to assess the potential for adverse effects from the watershed and to compare sediment quality with other coastal embayments in San Diego County. In Phase I, a stratified random approach was used to identify the three sites where COCs were most likely to be found (i.e., those with the highest TOC and smallest grains size. These sites were sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated that seven of the nine metals assessed were found in Sweetwater River sediments. Of these, copper and zinc exceeded their respective ERL values, but all concentrations were well below their respective ERMs. The mean ERM-Q for Sweetwater River Estuary was the second highest of any embayment assessed in the ABLM Program. The percent survival of test organisms exposed to Sweetwater River Estuary sediments was significantly different from that of the Control. In contrast to the chemistry and toxicity results, the benthic community indices had the highest relative rank of all the embayments assessed in the ABLM Program. The infaunal community was dominated by a genus of barley snail, the Asian mussel, and poychaete worms.

WMA Assessment

The Chollas Creek sub-watershed within the Pueblo San Diego watershed drains a very densely populated, urban area. Nearly 65% of the drainage area is residential and another 17% is commercial. All three bacterial indicators, diazinon and total copper and zinc have a high frequency of occurrence and

are identified as COCs. Other potential COCs include TSS, chlorpyrifos and dissolved copper. The benthic community impacts and stream habitat impairments may be a result of elevated COCs or physical alterations to the riparian corridor. TIEs were initiated, however, continued toxicity was not observed, suggesting a reduction in toxic effects between the time initial monitoring tests were conducted and the TIE began. It is recommended that additional TIEs be conducted to determine the likely source of toxicity in Chollas Creek to *Hyalella azteca*.

The Sweetwater River watershed drainage area consists of 50% vacant or undeveloped land, 30% residential and only 10% commercial. The contrast in land use compared to Chollas Creek may likely be the reason for better water quality in Sweetwater River. No high frequency COCs were identified within Sweetwater River. Potential COCs include bacterial indicators, TDS and diazinon. Monitoring conducted in the Sweetwater River Estuary, however, showed the occurrence of metals with copper and zinc exceeding ERL values. In addition, the sediments had the highest toxicity of the other embayments monitored. The bioassessment monitoring identified Sweetwater River as having a Very Poor IBI score. Similar to Chollas Creek, TIEs were initiated, however, toxicity was not observed suggesting a reduction in toxic effects between the time initial monitoring tests were conducted and the TIE began. It is recommended that additional TIEs be conducted to determine the likely source of toxicity in Sweetwater River.

ES.4.9 Tijuana River Watershed Management Area

Storm Water Monitoring Summary

Constituents most prevalent in Tijuana River that pose the greatest concern are typical of conditions found with untreated wastewater. BOD, COD, TSS, turbidity, nutrients (un-ionized ammonia-N and total phosphorus consistently exceed water quality objectives. In addition, pesticides are also prevalent in elevated concentrations. Diazinon, in particular, has exceeded water quality objectives in all nine of the last nine storms and has been identified as the likely cause of toxicity in the Tijuana River. Tijuana River has been identified as a TIE candidate site based upon acute toxicity to *Ceriodaphnia* utilizing the Triad Decision Matrix. Three compounds were singled out as being consistently associated with the toxic fraction of Tijuana River storm water during the 2002-2003 investigation; diazinon, methyl dihydrojasmonate, and quinoline and its byproducts. These three compounds were again identified and confirmed as contributing to toxicity in the 2003-2004 monitoring season.

Stream Bioassessment

One stream bioassessment monitoring site in the Tijuana River WMA was sampled in Campo Creek in May 2004. The Index of Biotic Integrity rating for the site was Poor, but there were several organisms collected that were otherwise found only at reference sites, and specific conductance was very low. The in-stream habitat of the site was marginal with anoxic silt deposits, and this may have prohibited the full colonization potential of macroinvertebrates.

Ambient Bay and Lagoon Monitoring

Sediments in Tijuana River Estuary were monitored as part of the 2003 ABLM Program to assess the potential for adverse effects from the watershed and to compare sediment quality with other coastal embayments in San Diego County. In Phase I, a stratified random approach was used to identify the three sites where COCs were most likely to be found (i.e., those with the highest TOC and smallest grains size). These sites were sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated

that six metals common to all embayments were also found in Tijuana River Estuary sediments. Concentrations were low and none exceeded their respective ERLs. In addition, there were no PAHs, PCBs, or pesticides found in the Estuary above the detection limit. As a result, the mean ERM-Q for Tijuana River Estuary was the second lowest of any of the embayments assessed in the ABLM Program. In addition, percent survival of test organisms exposed to Tijuana River Estuary sediments was not significantly different from that of the Control, suggesting that the sediments were not toxic to the test organisms. Benthic community indices suggested that the biotic community in Tijuana River Estuary was intermediate compared to the other embayments assessed. The infaunal community was co-dominated by three taxa: a polychaete worm, a genus of clam that was unique to the Tijuana River Estuary, and a gammarid amphipod.

WMA Assessment

The elevated densities of all three bacterial indicators and high concentrations of nutrients (un-ionized ammonia as N and total phosphorus) are indicative of wastewater discharges. The elevated nutrients are likely the cause of excessive BOD and COD values. Pesticides are also a persistent problem in the watershed. The TIEs conducted in 2003-2004 confirm initial results performed in 2002-2003 indicating diazinon, methyl dihydrojasmonate and quinoline (and its byproducts) are the primary contributors to toxicity in the Tijuana River. Stream bioassessement monitoring has been conducted upstream of any influence from Tijuana and surrounding communities and is not representative of the lower reaches of the Tijuana River directly affected by runoff from these communities. Data collected during the Ambient Bay and Lagoon Monitoring program suggest the elevated concentrations of numerous constituents observed in the Tijuana River are not impacting estuarine sediments. The Tijuana Estuary sediments did not contain any PAHs, PCBs or pesticides and results of toxicity tests were similar to those of a control.

ES.5 Regional Assessments

ES.5.1 Cross Watershed Comparison

Comparisons between watersheds were performed using several different statistical tools, including scatterplot analysis, regression analysis, analysis of variance (ANOVA), multivariate cluster analysis, and multiple regression.

Summary of Statistical Analyses

The Tijuana River was higher in concentration for most of the COC, particularly those associated with untreated wastewater and highly urbanized land use. This is a pattern that has been consistent throughout the past three years of monitoring. This MLS has also had the most consistent toxicity results with toxic reactions for all tests except those for *Selenastrum*. Notable patterns seen at other MLS include lower concentrations of diazinon than observed in earlier years; decreasing trends for lead, nickel, and zinc at Tecolote Canyon; increasing TSS and turbidity at Agua Hedionda and decreasing TSS and turbidity at Tecolote Canyon and Chollas Creek.

Cluster analysis showed the differences between Tijuana River and the other MLS primarily, followed by differences between years which may be related to the differing amounts of rainfall in the past three years.

Relationships between toxicity and COC based on the three years of data showed strong relationships for increasing toxicity with higher amounts of diazinon, TSS, and dissolved nickel. Strong relationships

based on the threshold analysis were also found for malathion which was not included in the regressions because it was not measured in all years.

ES.5.2 Rapid Stream Bioassessment Results

A total of 25 different stream monitoring reaches were assessed in San Diego County in the surveys of October 2003, and May 2004. Five of these sites were considered to represent reference conditions. A total of 48 different monitoring reaches have been sampled since May 2001.

Taxonomic identification of samples collected October 2003 produced 90 taxa from a total of 17,302 individuals. The May 2004 samples produced 104 taxa from 20,012 individuals.

The most abundant organisms in October 2003 in the study region were non-biting midges (Diptera: Chironomidae), *Hyalella* (Amphipoda: Hyalellidae) and *Hydropsyche* (Trichoptera: Hydropsychidae). The most abundant organisms in May 2004 in the study region were non-biting midges (Diptera: Chironomidae), *Simulium* (Diptera: Simuliidae) and *Baetis* (Epemeroptera: Baetidae). The majority of organisms from the urban affected sites were moderately or highly tolerant to stream impairments. Organisms highly intolerant to impairments were encountered infrequently at the urban affected sites, but their presence even in low numbers is significant. Non-reference sites that supported highly intolerant organisms included San Dieguito River-Del Dios Highway, Santa Margarita River-Camp Pendleton, and Santa Margarita River-Willow Glen Road.

The Index of Biotic Integrity ratings of the monitoring sites ranged from Very Good to Very Poor in October 2003 and May 2004. IBI scores for the reference sites were always higher than the scores for the urban influenced sites. The May 2004 survey produced consistently lower IBI scores across the entire region than in the October 2003 survey. Comparison of IBI scores with the in-stream physical habitat quality of the monitoring reaches indicated a poor correlation between habitat quality and benthic macroinvertebrate community quality.

Of all of the watersheds in San Diego County, the Santa Margarita River Watershed was the least impaired. The remaining watersheds have substantially greater amounts of urbanization, and the IBI results generally indicate that greater water quality impairment occurs in the lower portions of the watersheds, as the impacts of urban runoff become cumulative.

After 3½ years of bioassessment surveys, long-term trend analysis is becoming possible. The most significant observation is that the macroinvertebrate community quality has not shown any trend towards degradation or improvement. IBI scores for most of the San Diego sites were similar in May 2004 to May 2001. Individual seasons or years have produced better conditions for the macroinvertebrates, and many of the monitoring sites have shown a parallel response to the variability of the conditions.

ES.5.3 Ambient Bay and Lagoon Monitoring

The three sites identified in each of the 12 embayments were sampled and analyzed for chemistry, toxicity, and benthic community structure. PCBs and pesticides were not found in any of the embayments and PAHs were found only at low concentrations from two embayments: Oceanside Harbor and San Luis Rey River Estuary. A suite of six metals were found in all 12 embayments: arsenic, chromium, copper, lead, nickel, and zinc. Concentrations of metals were low in all embayments and there were no metals that exceeded their ERM thresholds. However, several metals exceeded ERL

values, including copper (exceeded the ERL at six sites), arsenic (exceeded the ERL at three sites), zinc (exceeded the ERL at two sites), and lead (exceeded the ERL at one site). The mean ERM-Q value, which represents the cumulative impact from all COCs for which ERMs are available, was greatest at Mission Bay and Sweetwater River Estuary and lowest at Santa Margarita River Estuary and Tijuana River Estuary.

For the toxicity assessment, the percent survival of a marine amphipod exposed to sediments from each of the embayments was compared to that of a Control. Percent survival was not significantly different from that of the Control for four embayments: Santa Margarita River Estuary, San Dieguito Lagoon, Mission Bay, and Tijuana River Estuary. Among the remainder of the embayments where percent survival was significantly different from that of the Control, survival was lowest at Sweetwater River Estuary, Batiquitos Lagoon, San Elijo Lagoon, and Agua Hedionda Lagoon.

For the benthic community assessment, animals collected from the sediment at three sites in each embayment were identified to the lowest possible taxonomic level. Several indices of benthic community structure were then calculated, including abundance, richness, diversity, evenness, and dominance. For each embayment the scores from these indices were ranked and the summed ranks were used to compare the benthic communities among the 12 embayments. Based on this overall ranking, the embayments with the relatively highest ranked benthic communities were Oceanside Harbor, Batiquitos Lagoon, Mission Bay, and Sweetwater River Estuary. Those with the lowest relative ranks were San Luis Rey River Estuary, Buena Vista Lagoon, San Elijo Lagoon, and San Dieguito Lagoon.

The relative ranks were developed from data collected in the summer of 2003 and presented for the first time in the 2004 report. However, attributing contaminants in the embayments directly to COCs in the watershed is premature at this time, particularly since samples for sediment chemistry and toxicity were based on a single composite for each embayment. Monitoring conducted in the future may help determine potential contaminant sources through the use of a longer-term data set.

The experimental design for the ABLM Program was based on a presumed positive correlation between COCs, TOC content, and grain size, where higher COC concentrations are expected in areas with higher TOC and smaller grain size. The results of the ABLM Program indicate a strong, positive relationship between mean ERM-Qs, TOC content, and percentage of fine-grained sediments. These results help validate the approach utilized in the ABLM Program. However, the relationships between sediment chemistry, toxicity, and benthic community structure were weak. This is likely due to the dynamic nature of coastal estuaries and a limited number of samples and analyses. Results from samples collected in subsequent years of the ABLM Program may help to strengthen these relationships, or a review and reassessment of program design may be required.

ES.5.4 Storm Water Modeling

ES.5.4.1 Static Storm Water Modeling

Static storm water modeling, described here, predicts average flows and contaminant concentrations based on watershed characteristics. A spreadsheet model was used to estimate annual runoff pollution loads and EMCs for the following constituents: nutrients (dissolved phosphorus and total Kjeldahl nitrogen); selected heavy metals (lead, copper, zinc, and cadmium); oxygen demand (BOD_5 and COD) and total suspended solids (TSS).

In general, the static storm water model indicated that the primary factor influencing water quality is land use. The primary factor in relation to the mass load emanating from each hydrologic unit is area. A secondary, but significant factor for mass loading is annual precipitation.

While the EMC model appears to estimate chemical oxygen demand, total Kjeldahl nitrogen, and dissolved phosphorus well, the potential for improvements in the model exists in estimates for metals. The model produces high EMCs versus measured concentrations for metals.

Observations based on the model help provide quantitative support to the intuitive concept that pollutant reduction strategies should:

1. Focus on improving water quality emanating from particular watersheds by developing and implementing BMPs that are designed to specifically reduce pollutants associated with certain land uses.
2. Focus sediment and pollutant accumulation monitoring activities below areas that drain large watersheds where the largest potential pollutant loads are expected.
3. Encourage pollution prevention, storm water educational outreach, and source control measures.

ES.5.4.2 Dynamic Storm Water Modeling

Dynamic modeling was performed to show variability between storms based on rain events or changes in water quantity and quality during a storm. The EPA's Storm Water Management Model (SWMM) was used to explore the potential of modeling the San Diego County watersheds to assist the Urban Runoff Monitoring Program.

All twelve watersheds associated with the mass loading stations were modeled. The SWMM model shows promise for estimating flow and water quality in the San Diego watersheds. However, given the variability in water quality concentration between storms, more study on the changes in pollutant concentrations during a runoff event will be needed to properly calibrate and validate a water quality model. Therefore, with only one study of discrete water quality samples at the mass loading stations, any water quality modeling output from SWMM would be preliminary.

Another approach to modeling worth exploring would be to use water quality meters to measure a few basic parameters such as flow, pH, DO, conductivity, and turbidity and model other parameters such as metals, bacteria, and pesticides from the measured parameters. This would provide a real time, inexpensive estimate of water quality. Multiple regression analysis was used for both watersheds to explore the relationships between the constituents. All four estimated constituents appear to be a reasonable model for the actual values. This demonstrates how modeling from data collected from installed pH, conductivity, flow, and turbidity meters can be used to model other constituents. This could reduce the need for frequent monitoring of chemical constituents.

If a model can be shown to accurately and consistently predict water quality at monitored stations, it is possible that the requirement for intensive monitoring could be reduced, helping to reduce the sampling cost and provide more resources to target water quality improvements.

ES.5.5 Coastal Outfall Data

The data used in this assessment was collected from April 1, 2003 through March 31, 2004 by the Copermittees.

Coastal Outfall Data Analysis Results for San Diego County

During the 2003-04 coastal outfall monitoring period, 32 stations were monitored from San Diego County beaches with paired samples (one from the shore and one from the storm drain). The data evaluated for this monitoring period indicate that there are occasional bacterial exceedences in the receiving water and storm drain outfall sampling locations and in the coastal outfall program receiving water sampling stations.

Coastal Lagoon Outfall Data Analysis Results for San Diego County

During the 2003-04 coastal lagoon outfall monitoring period, 38 stations were monitored from San Diego County lagoon outfalls and/or receiving waters. In some cases, paired samples (one from the storm drain and one from the shore) were collected. During wet weather only three outfalls had exceedances of at least one bacterial indicator in both the receiving water and the outfall samples. During dry weather ten outfalls had exceedances of at least one bacterial indicator in both the storm drain and receiving water samples.

ES.5.6 Dry Weather Data Analysis Results

The number of sites and times each site was sampled vary for each watershed and jurisdiction. During the 2003 Dry Weather monitoring period 373 samples were collected for laboratory testing. The COC most often above action level was total coliform (94 out of 373 or 25% of the time); fecal coliform and enterococcus were next in descending order. Other COC were oil and grease, turbidity, diazinon, conductivity, and nitrate in that order.

Comparison of the 2002 and 2003 dry weather data by land use reveals some minor change in the COC found in the major land use categories. The potential benefits of annually updating the list of COC by land use category are:

- the ability to assess the effectiveness of structural BMPs
- the ability to select non-structural BMPs (outreach)
- customizing inspections
- predicting water quality impacts
- determining overall changes in the prevalence of COCs

The Municipal Separate Storm Sewer System (MS4) conveyance type at each dry weather sampling location was logged by each jurisdiction. The potential benefits of annually updating the list of COC by MS4 conveyance type are:

- selecting BMPs for each type based on pollutants found
- selecting cleaning procedures or methods to target pollutants by MS4 type
- using land use and conveyance type COC data to minimize water quality impacts from new development
- prioritizing cleaning frequency of MS4 based on COC in the sub-watershed and/or 303(d) listings

ES.5.7 Third Party Regional Data

The San Diego Baykeeper's Binational Water Quality Monitoring Program (BWQMP) coordinated the 2003 Coast Wide Snapshot Day in San Diego County, taking field measurements for dissolved oxygen, pH, conductivity, air and water temperature, and turbidity. The 2003 BWQMP data provides some additional information for the water quality assessment of a few watersheds in San Diego County. Exceedances were noted for dissolved oxygen (7), turbidity (9) and *E. coli* (1). The most notable were three exceedances for turbidity in Tecolote Creek and three in San Diego River.

ES.6 Program Review

During the 2001-01 permit issuance, the Copermittees were required to review historical data and develop future recommendations. This was developed in the "San Diego Region Previous Storm Water Monitoring and Future Recommendations Report" (MEC 2001). The program design that was implemented in the 2001-2002 permit year was intended to provide:

- Information relating to chemical, physical, and biological impacts to receiving waters resulting from urban runoff,
- Indication of the overall health and long-term trends in water quality in the receiving waters.

To date these two over-arching goals have been met by the monitoring design, however, additional questions resulting from the collected data have yet to be answered. Such questions include "What are the dry weather (ambient) concentrations of the urban runoff constituents?" and "How do the constituents of concern vary throughout the watershed?"

Since the 2001-2002 monitoring year (the first year of monitoring under Order 2001-01) significant information has been gathered about each watershed management area in San Diego County under the monitoring program and associated assessments. This information forms the basis of existing knowledge about water quality that was not available for all watershed management areas prior to 2001-2002. Using this information, the Copermittees can refine their monitoring program to better address specific management questions and yield more baseline information against which improvements in water quality can be measured. As the Copermittees enter into a new permit cycle in 2006-2007, it presents an opportune time to reassess the existing monitoring program together with the management questions to define the future monitoring program approach for the next permit cycle.

ES.7 Recommendations

This report includes recommendations for improvement to the program. Those recommendations include implementing a two-year pilot study to identify the effects of urban runoff at the mass loading stations during non-storm events.

The recommended actions from the triad assessments are summarized in Section 14. All watersheds should continue water quality monitoring. The Chollas and Sweetwater River mass loading stations should continue to have TIEs performed.